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Reclamation and Development Grants Program

Project Evaluations and
Recommendations for
1992 - 1993 Biennium
and Status Report for
Previously Funded Projects

January 1991

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RECLAMATION
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GRANTS PROGRAM

**Project Evaluations and Recommendations
for 1992-1993 Biennium**

and

**Status Report for
Previously Funded Projects**

January 1991

**Montana Department of Natural
Resources and Conservation**

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CHAPTER I

PROGRAM DESCRIPTION AND PROCEDURES

Program Information

The Reclamation and Development Grants Program (RDGP) is a state-funded grants program designed to fund projects that "indemnify Montana citizens for the effects of mineral development on public resources and that meet other crucial state needs serving the public interest and the total environment of the people of Montana" (Section 90-2-1102, MCA). The program, established by the 1987 Montana Legislature, is administered by the Montana Department of Natural Resources and Conservation (DNRC).

In February 1990, an extensive promotional effort was launched that targeted all Montana communities, counties, the university system, conservation districts, state agencies, state legislators, and others who might benefit by program participation. This effort included mailing application materials and holding application instruction workshops throughout the state. The application deadline was May 15, 1990. DNRC received 39 applications for RDGP funding totaling over \$8.8 million.

The funding source for this program is the interest income from the Resource Indemnity Trust Fund (RITF). This fund, established by Section 15-38-201, MCA, receives proceeds from taxes levied on mineral production. The 1987 Montana Legislature directed that, beginning in state fiscal year 1990, 46 percent of the interest income from RITF must be allocated to the Reclamation and Development Grants Program (approximately \$8.1 million for the 1992-1993 biennium). During state fiscal years 1986 through 1991, 64 projects totaling more than \$10.4 million have been funded.

The Reclamation and Development Grants Program Act requires that the governor submit, by the first day of each regular session of the legislature, a list of all grant proposals received with his recommended priorities for funding. Administrative rules further provide that DNRC must furnish to the legislature a status report on previously funded projects. This report is the result of those directives.

Project Eligibility

The following excerpts from the Reclamation and Development Grants Program Act (Section 90-2-1111, MCA) establish criteria that projects must meet in order to be eligible for funding.

- (1) Except as provided under subsection (2), to be eligible for funding under the Reclamation and Development Grants Program, the proposed project must provide benefits in one or more of the following categories:
- (a) reclamation of land, water, or other resources adversely affected by mineral development;
 - (b) mitigation of damage to public resources caused by mineral development;
 - (c) research, demonstration, or technical assistance to promote the wise use of Montana minerals, including efforts to make processing more environmentally compatible;
 - (d) investigation and remediation of sites where hazardous wastes or regulated substances threaten public health or the environment; and
 - (e) research to assess existing or potential environmental damage resulting from mineral development.
- (2) If sufficient eligible and qualified applications satisfying the mineral development objectives provided for in subsection (1) are not received, or if there is a crucial state need, DNRC may evaluate and the governor may recommend that the legislature approve funding for projects that:
- (a) enhance Montana's economy through the development of natural resources; or
 - (b) develop, promote, protect, or further Montana's total environmental and public interest, including the general health, safety, welfare, and public resources of Montana citizens and communities.

Applicant Eligibility

Any department, agency, board, commission, or other division of state government or any city, county, or other political subdivision or tribal government within the state may apply for a grant from the Reclamation and Development Grants Program.

Funding Limits

No grant may exceed \$300,000. An applicant proposing more than one project may submit a separate application for each. There is no minimum funding limit.

Application Review And Ranking Procedures

The grant applications were evaluated for the proposed projects' technical and financial feasibility, public benefits to be provided, need and urgency, and impacts on the environment.

Reviewers included staff members of the department's Resource Development, Conservation Districts, and Water Management Bureaus, with assistance from federal, state, and university personnel having expertise in specific project areas. For each application, a descriptive project summary was written incorporating the concerns, ideas, and comments of the project reviewers; those summaries appear in Chapter III and Chapter IV of this report.

More funds are requested than are available. Therefore, the department ranks feasible projects, so that it can recommend funding priority and funding level to the legislature. Evaluation criteria established by the 1987 legislature include, but are not limited to:

1. The degree to which the project will provide benefits in its eligibility category or categories
2. The degree to which the project will provide public benefits
3. The degree to which the project will promote, enhance, or advance the policies and purposes of the Reclamation and Development Grants Program
4. The degree to which the project will provide for the conservation of natural resources
5. The degree of need and urgency for the project
6. The extent to which the project sponsor or local entity is contributing to the costs of the project or is generating additional nonstate funds
7. The degree to which jobs are created for persons who need job training, receive public assistance, or are chronically unemployed
8. Any other criteria DNRC considers necessary to carry out the policies and purposes of the Reclamation and Development Grants Program

Under the ranking system, a proposal could receive a maximum of 215 points. Specific criteria were established for each category to provide consistency. Of the following criteria, public benefits and need and urgency were weighted most heavily.

	<u>Maximum Points Possible</u>
1. Public Benefits	90
2. Need and Urgency	50
3. Appropriateness of Technical Design	40
4. Financial Feasibility	15
5. Project Management Organization	20
Total Possible Points:	215

Recommendations

After ranking the projects and recommending funding, the Conservation and Resource Development Division made its recommendations to the DNRC director. The director then presented DNRC's recommendations to the governor. An appropriations bill listing the governor's recommendations will be introduced to the 1991 legislature. By appropriation or other appropriate means, the legislature may approve grants for those projects it finds consistent with the policies and purposes of RDGP.

CHAPTER II
RANKING OF AND FUNDING RECOMMENDATIONS
FOR PROJECTS PROPOSED TO THE 1991 LEGISLATURE

NAME OF APPLICANT	PROJECT NAME	PUBLIC BENEFITS			NEED AND TECHNICAL URGENCY			FINANCIAL FEASIBILITY			PROJECT MANAGEMENT			TOTAL	RECOMMENDED FUNDING	ACCUMULATIVE TOTAL
		URGENCY	DESIGN	BENEFITS	URGENCY	DESIGN	BENEFITS	URGENCY	DESIGN	BENEFITS	URGENCY	DESIGN	BENEFITS			
1. Butte-Silver Bow Government	WASTEC Rehab. & Betterment Element of Milk River	79	49	36	13	13	18	195	\$296,113	\$296,113	\$300,000	\$300,000	\$300,000	\$300,000	\$300,000	\$300,000
2. Chinook Division Irr. Association	Community-Led Rural Development in Montana	68	50	36	13	15	182	178	\$170,000	\$170,000	\$171,000	\$171,000	\$171,000	\$171,000	\$171,000	\$171,000
3. Judith Basin CD	Aero Refinery Sludge Cleanup	79	46	28	11	14	178	171	\$300,000	\$300,000	\$1,066,113	\$1,066,113	\$1,066,113	\$1,066,113	\$1,066,113	\$1,066,113
4. DHE/Cent. Mt. Health District	Abandoned Well Plugging Project "A"	70	45	32	6	18	171	170	\$300,000	\$300,000	\$1,366,113	\$1,366,113	\$1,366,113	\$1,366,113	\$1,366,113	\$1,366,113
5. MT Board of Oil and Gas Cons.	Abandoned Well Plugging Project "B"	70	42	34	8	16	166	166	\$295,000	\$295,000	\$1,661,113	\$1,661,113	\$1,661,113	\$1,661,113	\$1,661,113	\$1,661,113
6. MT Board of Oil and Gas Cons.	NRIS, Emphasis on the Nat. Healt. Progr. and GIS	67	41	34	8	16	17	163	\$227,600	\$227,600	\$1,888,713	\$1,888,713	\$1,888,713	\$1,888,713	\$1,888,713	\$1,888,713
7. MT State Library	Soil & Water Nonpoint SRC Poll Control & Mgmt.	65	43	29	9	17	160	160	\$137,500	\$137,500	\$2,026,213	\$2,026,213	\$2,026,213	\$2,026,213	\$2,026,213	\$2,026,213
8. MT Salinity Control Association	Effect of Sodium, Chlorine, & Total Salts	69	41	28	6	16	159	159	\$62,885	\$62,885	\$1,109,098	\$1,109,098	\$1,109,098	\$1,109,098	\$1,109,098	\$1,109,098
9. MSU/Reclamation Research Unit	Integrated Waste Management in SC MT	60	40	34	7	18	158	158	\$45,437	\$45,437	\$2,154,535	\$2,154,535	\$2,154,535	\$2,154,535	\$2,154,535	\$2,154,535
10. Carbon County, et al	Integrated Waste Management in SC MT	68	38	25	12	15	158	158	\$46,620	\$46,620	\$2,301,155	\$2,301,155	\$2,301,155	\$2,301,155	\$2,301,155	\$2,301,155
11. DHE/Swater Quality Bureau	Nonpoint Pollution Control Project	59	43	25	11	16	154	154	\$39,749	\$39,749	\$2,340,904	\$2,340,904	\$2,340,904	\$2,340,904	\$2,340,904	\$2,340,904
12. MT Mines & Geology, Bureau of	Downhole Geo Logging Tech/Well	59	41	28	8	17	153	153	\$144,000	\$144,000	\$2,484,904	\$2,484,904	\$2,484,904	\$2,484,904	\$2,484,904	\$2,484,904
13. MT Board of Oil and Gas Cons.	Abandoned Well Plugging Project "C"	63	33	32	8	16	152	152	\$105,000	\$105,000	\$2,589,904	\$2,589,904	\$2,589,904	\$2,589,904	\$2,589,904	\$2,589,904
14. Toole County	N. Toole County Reclamation Project	61	39	27	5	12	144	144	\$300,000	\$300,000	\$2,889,904	\$2,889,904	\$2,889,904	\$2,889,904	\$2,889,904	\$2,889,904
15. Pesticide Co. Cleanup Committee	Pesticide Contamination Cleanup	62	39	27	3	12	143	143	\$300,000	\$300,000	\$3,189,904	\$3,189,904	\$3,189,904	\$3,189,904	\$3,189,904	\$3,189,904
16. State Lands, Dept. of	Well Assessment and Abandonment	59	32	30	9	12	142	142	\$300,000	\$300,000	\$3,469,733	\$3,469,733	\$3,469,733	\$3,469,733	\$3,469,733	\$3,469,733
17. DNRC/Water Mgmt. Bureau	Arsenic in Upper Missouri River Basin	50	36	25	11	18	140	140	\$179,330	\$179,330	\$3,619,934	\$3,619,934	\$3,619,934	\$3,619,934	\$3,619,934	\$3,619,934
18. State Lands, Dept. of	Comet Mine Wetlands Development	56	46	23	7	7	139	139	\$280,700	\$280,700	\$3,817,387	\$3,817,387	\$3,817,387	\$3,817,387	\$3,817,387	\$3,817,387
19. Glacier Co., CD	Comprehensive Eval. of Groundwater Contamination	45	40	18	7	16	126	126	\$197,453	\$197,453	\$4,035,637	\$4,035,637	\$4,035,637	\$4,035,637	\$4,035,637	\$4,035,637
20. DHE/Swater Quality Bureau	Hydrogeo, Land Use, & Chemical Qual of Water	37	31	22	10	16	116	116	\$218,250	\$218,250	\$4,326,037	\$4,326,037	\$4,326,037	\$4,326,037	\$4,326,037	\$4,326,037
21. Fort Peck Assin/Sioux Tribes	Extent, Mag., & Mvmt. of Contamination	27	35	17	9	16	104	104	\$280,400	\$280,400	\$4,460,773	\$4,460,773	\$4,460,773	\$4,460,773	\$4,460,773	\$4,460,773
22. Sheridan Co., CD	Extent of Oil-Field Waste Contamination	27	30	18	7	15	97	97	\$134,736	\$134,736	\$4,460,773	\$4,460,773	\$4,460,773	\$4,460,773	\$4,460,773	\$4,460,773
23. Butte-Silver Bow Government (NF)	Upper Clark Fork River Basin Coordinator	0	0	0	0	0	0	0	\$0	\$0	\$4,460,773	\$4,460,773	\$4,460,773	\$4,460,773	\$4,460,773	\$4,460,773
24. Montana Tech (NF)	Pilot Plant Treatment of Cont. Water from Pit	0	0	0	0	0	0	0	\$0	\$0	\$4,460,773	\$4,460,773	\$4,460,773	\$4,460,773	\$4,460,773	\$4,460,773
25. State Lands, Dept. of (NF)	Cataract Creek Reclamation Project	0	0	0	0	0	0	0	\$0	\$0	\$4,460,773	\$4,460,773	\$4,460,773	\$4,460,773	\$4,460,773	\$4,460,773
26. Montana Tech (NF)	Const. Art. Bogs and Wetlands	0	0	0	0	0	0	0	\$0	\$0	\$4,460,773	\$4,460,773	\$4,460,773	\$4,460,773	\$4,460,773	\$4,460,773
27. Montana Tech (NF)	Detoxification of Acid Mine Drainage from Pit	0	0	0	0	0	0	0	\$0	\$0	\$4,460,773	\$4,460,773	\$4,460,773	\$4,460,773	\$4,460,773	\$4,460,773
28. MSU/Animal & Range Sci. Dept. (NF)	Pyrite Amendments, to Improve Plant & Animal Nutr.	0	0	0	0	0	0	0	\$0	\$0	\$4,460,773	\$4,460,773	\$4,460,773	\$4,460,773	\$4,460,773	\$4,460,773
29. Yellowstone County (NF)	Yellowstone Co. LIS/GIS Project	0	0	0	0	0	0	0	\$0	\$0	\$4,460,773	\$4,460,773	\$4,460,773	\$4,460,773	\$4,460,773	\$4,460,773
30. Homestead Acres Water & Sewer (NF)	Bozeman Mine Reclamation Project	0	0	0	0	0	0	0	\$0	\$0	\$4,460,773	\$4,460,773	\$4,460,773	\$4,460,773	\$4,460,773	\$4,460,773
31. Judith Basin Co. (NF)	Development of Iron Ore Deposit	0	0	0	0	0	0	0	\$0	\$0	\$4,460,773	\$4,460,773	\$4,460,773	\$4,460,773	\$4,460,773	\$4,460,773
32. MSU/Biology Department (NF)	Trout Stream Restoration	0	0	0	0	0	0	0	\$0	\$0	\$4,460,773	\$4,460,773	\$4,460,773	\$4,460,773	\$4,460,773	\$4,460,773
33. MT Mines & Geology Bureau of (NF)	Hydrogeologic Char. of Landfill Sites in MT	0	0	0	0	0	0	0	\$0	\$0	\$4,460,773	\$4,460,773	\$4,460,773	\$4,460,773	\$4,460,773	\$4,460,773
34. Deer Lodge Valley CD (NF)	Feasibility Study of Wood Wastes	0	0	0	0	0	0	0	\$0	\$0	\$4,460,773	\$4,460,773	\$4,460,773	\$4,460,773	\$4,460,773	\$4,460,773
35. Yellowstone Co. CD (NR)	ZooMontana Construction Fund Drive	0	0	0	0	0	0	0	\$0	\$0	\$4,460,773	\$4,460,773	\$4,460,773	\$4,460,773	\$4,460,773	\$4,460,773
36. Hot Springs, Town of (NR)	Re-Util. of Hot Springs Mineral Water Res.	0	0	0	0	0	0	0	\$0	\$0	\$4,460,773	\$4,460,773	\$4,460,773	\$4,460,773	\$4,460,773	\$4,460,773
37. Sweet Grass Co. CD (NR)	Accelerate Soil Survey Proj. for MT	0	0	0	0	0	0	0	\$0	\$0	\$4,460,773	\$4,460,773	\$4,460,773	\$4,460,773	\$4,460,773	\$4,460,773
38. Stillwater Cons. Dist. (NR)	Field Eval. of Plastic Lining & Fab. Process	0	0	0	0	0	0	0	\$0	\$0	\$4,460,773	\$4,460,773	\$4,460,773	\$4,460,773	\$4,460,773	\$4,460,773
39. Glacier Co. (NR)	Glacier Co. Experimental Lateral Drilling Proj.	0	0	0	0	0	0	0	\$0	\$0	\$4,460,773	\$4,460,773	\$4,460,773	\$4,460,773	\$4,460,773	\$4,460,773

(NF) = Ranked, but no funding recommended

(NR) = Not ranked, ineligible, did not meet crucial state need test, not qualified

CHAPTER III

SUMMARIES OF PROJECTS RECOMMENDED FOR FUNDING

Summaries of all projects recommended for RDGP funding, along with the amounts recommended, are presented in this chapter. The summaries appear in the order in which the projects are ranked.

- 1 -

APPLICANT NAME: Butte-Silver Bow Government

PROJECT/ACTIVITY NAME: WASTEC (Water, Air, Soils Testing and Evaluation Center)

AMOUNT REQUESTED: \$ 296,113

OTHER FUNDING SOURCES AND AMOUNTS:

Applicant	\$ 1,582
U.S. Department of Energy (DOE)	\$ 7,636,000

TOTAL PROJECT COST: \$ 7,933,695

PROJECT DESCRIPTION:

This funding proposal would aid applicant's efforts to locate and develop a U.S. Department of Energy (DOE) National Waste Technology Center (hereafter known as the "Center") in Butte, Montana. A main function of the Center would be to develop, test, and certify innovative technologies to effectively treat hazardous waste materials found in four Clark Fork Superfund sites established under the federal Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

The four "Clark Fork sites" are the Silver Bow Creek/Butte Area, Anaconda Smelter, Milltown Reservoir, and Montana Pole. Collectively they extend downstream from the City of Butte in the Upper Silver Bow Creek drainage area through the Deer Lodge Valley to Missoula. Within the Clark Fork sites are high priority problem areas that are being or will be addressed over the next several years, including: the Berkeley Pit and underground mine flooding; mine waste deposits on floodplains (including the Colorado tailings); soil contamination in the vicinity of Butte, Walkerville, and Anaconda; the Warm Springs ponds; and the Old Works tailings. The environmental problems associated with each area are significant and pose threats to groundwater, surface water, and the health of area citizens. In addition, there are many unknown factors associated with the Clark Fork sites, and new problems continue to surface.

Before a technology can be used to remediate a CERCLA (Superfund) site, the federal government requires considerable test data as to the effectiveness of the technology. These data must be generated from a demonstration site of sufficient scale to assure the applicability, efficiency, and operability of the technology on the site. The Clark Fork sites appear to meet this requirement ideally.

The applicant proposes to establish such a testing and evaluation center. Technologies developed at the Center would then be transferred to other public sector agencies or private entities to be used in the actual cleanup process. Technologies developed would also have potential applications for environmental problems elsewhere in the state and nation.

Butte-Silver Bow's Reclamation and Development Grant application for \$296,113 would be matched by a significant level of funding by DOE. The Center concept involves job retention and creation and represents a very important component of Butte-Silver Bow's economic development strategy.

TECHNICAL ASSESSMENT:

The health and welfare of the residents of Butte-Silver Bow, Anaconda, Deer Lodge, and other communities within the Clark Fork River basin would benefit from finding effective, efficient technologies to treat the waste materials left behind by 110 years of mining in the area.

WASTEC may hold the key to developing the necessary technologies that can be used by the private or public sector to mitigate mineral development damage at the Superfund sites. Additionally, the technologies might be transferable to solve non-Superfund environmental contamination problems in Montana and the nation. DOE, for instance, is especially interested in the development of groundwater decontamination processes, as groundwater contamination is the principal waste management problem in the U.S. today.

The creation of a DOE National Testing and Evaluation Center for Non-Radioactive Waste Treatment Technology Development would also offer southwest Montana and the state a unique economic development opportunity. These benefits would include:

1. Creation of an opportunity to employ a construction work force of 50 to 75 for a one- or two-year period
2. Creation of a permanent operational and administrative work force of 100 to 150

3. Direct financial impact on the Butte-Silver Bow community projected to be \$12 to \$15 million annually, of which approximately 60 percent would be in the form of employee wages and benefits
4. Expansion of Montana's technical base and work force, thereby complementing efforts of units of the Montana University System, their associated Centers of Excellence, and the Montana Science and Technology Alliance
5. Creation of additional job opportunities for graduates of the Montana University System
6. Opportunity to create technical business spin-offs from technologies developed, tested, and certified by the Center

Overall, community support and advance planning for this project have been impressive.

FINANCIAL ASSESSMENT:

Estimated costs for contracted services (broken down by activity) are:

Screen water and soil treatment technologies	\$ 10,000
Develop design requirements	15,000
Select initial group of technologies for evaluation	2,000
Develop conceptual design of existing facility modifications and pilot/demo installations	130,000
Complete EPA test center application	25,000
Complete environmental assessment and permit application	98,000
Prepare technology transfer plan	<u>10,000</u>
TOTAL	\$290,000

Salaries and wages account for the remaining \$6,113. Costs are not unrealistic for the work being proposed.

The work described here would culminate in the completion of conceptual designs for existing facility modifications and pilot plant/demonstration scale processes, plus permit applications. Subsequent activities (and funding) would target preliminary and detailed engineering designs of candidate technologies, construction of facility modifications, testing, and technology transfer.

At this writing, exact uses and amount of federal match funding are not finalized. Butte-Silver Bow has received \$100,000 thus far. Funding in the amount of \$3.5 million has

been approved by the U.S. Senate. Congressional approval for further funding is anticipated early in 1991.

Although RDGP funds are apparently not essential to receipt of federal funds, state funding and participation in all likelihood would significantly enhance the probability of federal funds being secured.

ENVIRONMENTAL EVALUATION:

The evaluation of the feasibility of locating a testing and evaluation center in Butte would have little, if any, impact on the environment. However, technologies developed as a result of this project would potentially have a very positive impact on soils, water, vegetation, and air quality of the area.

PUBLIC BENEFITS ASSESSMENT:

The principal public benefits associated with this project would be development of information on innovative environmental technologies and bolstering of the state's economy. If this project leads to siting of WASTEC in Butte, the benefits would be considerable.

RECOMMENDATIONS:

A grant of up to \$296,113 is recommended for this project, contingent upon the following:

1. DNRC must approve the project scope of work and budget.
2. Butte-Silver Bow must secure at least \$1 million in federal match funds.

APPLICANT NAME: Chinook Division Irrigation Association

PROJECT/ACTIVITY NAME: Milk River Water Supply Project
Rehabilitation and Betterment Element
(Canals and Laterals)

AMOUNT REQUESTED: \$ 300,000

OTHER FUNDING SOURCES AND AMOUNTS:

Water Development Program Grant	\$ 100,000
Renewable Resource Development	
Program Grant	\$ 100,000
Applicant	\$ 1,002,775
U.S. Bureau of Reclamation Loan	\$ 4,508,325

TOTAL PROJECT COST: \$ 6,011,100

PROJECT DESCRIPTION:

The 172 farms within the Chinook Irrigation Division comprise just over 38,000 irrigated acres of the 92,000-acre Milk River Irrigation Project. The project facilities are operated by the U.S. Bureau of Reclamation. Most of the facilities for the five irrigation districts that make up the Chinook Division were financed and constructed prior to 1911. Because many of the project structures are more than 70 years old, they have become obsolete, inefficient, and--in some cases--hazardous to project operators.

The Chinook Division Irrigation Association intends to repair and replace some existing structures and add new structures as part of a basin wide program to reduce chronic water shortages that have plagued the Milk River drainage. Based on preliminary engineering design work, project rehabilitation costs for the Chinook Division are estimated to be \$6,011,100 (1989 dollars). The association is seeking a U. S. Bureau of Reclamation Small Projects Loan for \$4,508,325 to help finance the rehabilitation effort. In order to secure this interest-free, 30-year federal loan, the districts must meet a 25 percent local cost-share requirement. The districts have applied for a total of \$500,000 in grants from DNRC's Water Development, Renewable Resource Development, and Reclamation and Development Grants Programs. These grant funds, together with a \$1,002,775 local contribution, will meet the local cost-share requirement for the federal loan.

The project will involve lining about 53 miles of canals and laterals; cleaning and reshaping along 35.8 miles of main canal and 41 miles of laterals; cleaning and reshaping along 76.5 miles

of drains; installing access roads on the main canals and some laterals; installing three concrete rating structures on main canals and laterals; rehabilitating two pumping stations, a diversion structure, and a headworks structure; replacing seven siphons and installing two new siphons; replacing a wastewater; repairing or replacing 12 checks; and installing 106 measuring devices on canals and laterals. This rehabilitation effort would reduce irrigation water shortages by an estimated 9,870 acre-feet annually. The RDGP grant would be used to clean, reshape, and line canals and laterals; clean and reshape drains; and install access roads.

TECHNICAL ASSESSMENT:

Under historical climate conditions and at the present level of development, Milk River irrigators can expect to face significant water shortages in six years out of ten. The average annual shortages are estimated at 122,600 acre-feet or about 20 percent of diversion requirements. These shortages are expected to increase by about 28,000 acre-feet per year in the future when Canada and tribes on the Fort Belknap Reservation make use of their legal share of Milk River waters.

The Milk River Basin has been the subject of an intensive joint effort between the irrigation districts in the basin, the U.S. Bureau of Reclamation, the Department of Natural Resources and Conservation, and others to develop a strategy to reduce chronic water shortages. A water supply simulation model developed for the basin, irrigator surveys, and field investigations have revealed that shortages are caused by periodic severe droughts, overdevelopment of acreage for irrigation relative to the water supply the project was originally designed to provide, and an aging distribution system that is unable to carry enough water to meet the demands of current irrigation operations. As a result of these efforts, a three-phase plan for the Milk River was formulated that is aimed at improving management of available water, increasing water use efficiency through structural rehabilitation of the entire system, and increasing basin water supply.

The proposed project is part of the second phase of a technically sound, well-documented, and well-supported strategy to reduce water shortages. Successful completion of the proposed project may be especially important because it will result in the first substantial, on-the-ground improvements to local facilities arising from the multi-year basin planning effort. In addition, this effort may help pave the way for financing of future system improvements through the federal Pick-Sloan Program.

Preliminary project costs were developed by engineers for the U.S. Bureau of Reclamation. Final project designs will be approved by the U.S. Bureau of Reclamation.

FINANCIAL ASSESSMENT:

All grant funds will be used to fund construction during the first three years of the seven-year design and construction period. Final design and engineering are expected to cost almost \$800,000; construction costs are estimated at about \$5.2 million. The costs of the project are lower than might be expected because much of the work will be done by the irrigation district work force.

Farm budget studies by the Bureau of Reclamation indicate that, under current conditions, the ability of the district irrigators to pay for improvements is zero. A survey of irrigators showed that they would be willing to pay up to \$5.00/acre/year for these improvements, in spite of the fact that doing so would reduce their disposable income below Bureau of Reclamation guidelines.

Current project assessments for irrigated acreage within the Chinook Division average \$6.50/acre/year. Without the grant money, annual costs to irrigators for the Small Projects Loan would increase by \$5.60/acre/year. With all of the grant money requested, annual payments would increase by \$3.90/acre/year.

ENVIRONMENTAL EVALUATION:

The project would have positive environmental impacts on some resources and negative environmental impacts on others.

The most significant negative impact would be the loss of over 700 acres of vegetation and wildlife habitat as a result of construction, ditch cleaning, and the reduction in seepage that sustains some of these areas. Wildlife habitat loss may be mitigated to some extent by re-establishment of some habitat along rights-of-way and off-site improvement of habitat at Lonesome Lake near Big Sandy. Groundwater recharge in some areas would also be reduced.

Positive impacts are also associated with decreasing the volume of leakage from the distribution system. These include reducing the extent of water-logged and seep-affected agricultural and residential lands and improving groundwater quality.

PUBLIC BENEFITS ASSESSMENT:

Public benefits associated with this project are substantial. The area's economy is heavily reliant on agriculture, an important component of which is supported by irrigation. The project would result in a more dependable water supply for 172 family farmers in the Chinook Division and

indirectly benefit many of the 15,540 rural and urban people living in the Havre, Chinook, and Harlem areas.

Improved water management and reduced leakage from canals and laterals would reduce irrigation shortages by almost 10,000 acre-feet per year. These actions would also reduce the number of acres of potentially productive lands now lost to saline seep and water logging as a result of distribution system leakage. Ponded water would also be reduced, decreasing mosquito populations and the costs of controlling this well-known problem. The infusion of \$6 million of project funds--75 percent of which would be federal money--into the local economy during the seven-year construction period would create some construction jobs and benefit local businesses. Such benefits may be especially important for Blaine County, since it has the highest unemployment rate of any county along the Hi-Line. Finally, the project could be important in encouraging basin residents to follow through on their plan to secure federal funding to further reduce water shortages that have destabilized the local economy.

RECOMMENDATIONS:

A grant of up to \$300,000 is recommended contingent upon the following.

1. DNRC must approve the project scope of work and budget.
2. The association must designate a suitable public entity to receive and administer the grant funds.
3. The association must secure the remainder of project funding.

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APPLICANT NAME: Judith Basin Conservation District

PROJECT/ACTIVITY NAME: Community-Led Rural Development in Montana

AMOUNT REQUESTED: \$ 291,950

OTHER FUNDING SOURCES AND AMOUNTS:

Conservation Districts Bureau (DNRC)	\$ 79,300
U.S. Forest Service	\$ 47,000
Applicant	\$ 211,271

TOTAL PROJECT COST: \$ 629,521

PROJECT DESCRIPTION:

According to *Eye on Business* (Montana Chamber of Commerce, Volume 19, No. 1, January 1990), in 1989 Montana's economy placed 47th in both personal income growth and diversification of its resource base into value-added products. Another source, *Outlook--Entering the 1990s* (University of Montana, Bureau of Business and Economic Research, Winter 1990), indicates the state's population has declined from 825,000 to 806,000 between 1985 and 1989. Overall, personal income in Montana was stable in the 1980s, while throughout the nation personal income increased during the same period. Montana's nonfarm labor income steadily declined between 1979 and 1989. In 1988 per capita income in Montana fell to 78 percent of the national average. The applicant proposes, therefore, that a locally based method to stimulate regional economies is needed in Montana.

The purpose of this proposal is to implement a statewide community-led rural development effort through the organization and development of four new Resource Conservation and Development (RC&D) areas. RC&Ds are regional organizations made up of representatives from local governments and conservation districts. Their primary goal is to help people conserve, develop, and utilize natural resources. RC&Ds are concerned about economic benefits and the social well-being of all people in their area. RC&Ds operate from a management plan that is continually updated to meet local needs. They work in areas of natural resource management, economic development, community development, and human development.

This program would provide an opportunity for local governments and citizens to solve local economic problems. These new organizations would also provide a mechanism for receiving federal, state, and private economic development assistance. Specifically, RC&Ds have helped to develop irrigation districts, organize forestry and weed projects, reclaim areas damaged by mineral development, plan water reservations, and develop community parks and centers.

The RC&D community-led approach includes three phases: (1) community-led workshops for education, economic planning, and ensuring local city and county commitment to the entire economic development effort; (2) organization of RC&D areas; and (3) start-up operation of RC&D areas. This grant would be used for phase three in four new RC&D areas: Central Montana (Fergus, Golden Valley, Judith Basin, Musselshell, Petroleum, and Wheatland Counties); Eastern Montana (Carter, Custer, Daniels, Dawson, Fallon, Garfield, McCone, Powder River, Prairie, Richland, Roosevelt, Rosebud, Sheridan, Treasure, Valley, and Wibaux Counties); Northwest Montana (Flathead, Lake, Lincoln, and

Sanders Counties); and Northern Montana (Blaine, Cascade, Chouteau, Glacier, Hill, Liberty, Phillips, Pondera, Teton, and Toole Counties).

TECHNICAL ASSESSMENT:

The poor health of Montana's economy is well described. The methodology for setting up the new RC&Ds is well laid out. Since this is a proposal to establish new RC&D areas, specific projects to be undertaken by the new RC&Ds are not outlined. The application discusses the success of the Headwaters RC&D's efforts serving Anaconda/Deer Lodge, Beaverhead, Broadwater, Butte/Silver Bow, Granite, Jefferson, Madison, and Powell Counties. Headwaters RC&D would be used as an organizational model for the four new RC&Ds. The Headwaters RC&D has provided a mechanism for galvanizing and bringing new ideas to fruition. It has been very effective at helping to bring grant dollars to the area and focusing agency assistance.

The proposed Eastern Montana RC&D Area has gotten underway in the last 18 months. The first phase (training workshops) has already been completed. The area is in great need of a full-time coordinator to continue the present impetus and enthusiasm. The Central Montana RC&D Area received \$79,000 from the 1989 legislature; an additional \$40,000 will tide it over until federal RC&D funding is approved. The Northwest RC&D Area received \$67,000 from the U.S. Forest Service to explore economic development options. The requested funds will allow the RC&D to continue with research of potential economic development projects. The Northern RC&D effort has just begun and has not yet conducted the first phase to ensure local city and county commitment to the entire economic development effort.

FINANCIAL ASSESSMENT:

The budget is well documented and appears reasonable. The budget breakdown is listed below.

Salaries and wages	\$119,156
Employee benefits	44,294
Supplies and materials	21,500
Communications	24,000
Travel	48,000
Equipment	<u>35,000</u>
 TOTAL	 \$291,950

Basically, the applicant is requesting funding for two new RC&D coordinators for the Eastern and Northern areas, fringe benefits for all four RC&D coordinators, and supplies, materials, communications, travel, and rent for all four RC&D offices.

ENVIRONMENTAL EVALUATION:

This project will not directly degrade the environment since it only involves the establishment of RC&D areas. Environmental effects will depend on the type of projects undertaken by the RC&Ds. An RC&D's primary goal is to aid in the conservation, development, and utilization of natural resources. Projects to conserve resources would result in beneficial effects on the environment. Conversely, natural resource development and utilization projects could have adverse environmental effects, but these will be governed by the Montana Environmental Policy Act.

PUBLIC BENEFITS ASSESSMENT:

This proposal, if successfully implemented, has the potential to improve and enhance people's lives throughout Montana by bolstering and diversifying the economy. RC&Ds are concerned about both economic benefits and social well-being of residents in their areas. RC&Ds have helped to develop flood control projects, develop community centers and parks, establish new businesses, market new inventions, and meet community needs with educational programs.

RECOMMENDATIONS:

Counties and conservation districts included in the newly formed RC&D areas will act as sponsors. DNRC recommends that each sponsor contribute matching funds for annual RC&D operations. Initial training needs for new RC&D coordinators were not addressed in the budget. A portion of the travel budget should be used to send coordinators to regional and national training programs on rural community economic development.

A grant of up to \$170,000 is recommended for this project with the following contingencies.

1. DNRC must approve the project scope of work and budget for each RC&D area.
2. Adequate reporting from each RC&D area will be required to ascertain RC&D effectiveness.
3. DNRC will require a management plan for funds disbursement and grant administration at each RC&D office.

APPLICANT NAME: Montana Department of Health and Environmental Sciences (DHES) and Central Montana Health District

PROJECT/ACTIVITY NAME: Arro Refinery Sludge Cleanup

AMOUNT REQUESTED: \$ 300,000

OTHER FUNDING SOURCES AND AMOUNTS:

Applicant \$ 15,000

TOTAL PROJECT COST: \$ 315,000

PROJECT DESCRIPTION:

The Central Montana Health District and the Montana Department of Health and Environmental Sciences are applying for a grant to clean up two sludge pits at the Arro Oil Refinery in Lewistown, Montana. This is an abandoned oil refinery 4 miles northwest of Lewistown that operated from the 1920s to the 1940s. The company dismantled the refinery and has since dissolved. Research indicates no viable parties exist that could be held responsible for cleanup of the site. The sludge pits encompass about 5,320 square feet. The refinery site covers approximately 40 acres. Six residences and pastureland are located on the site.

DHES and the U.S. Environmental Protection Agency (EPA) have conducted investigations of contamination problems at the site. Those investigations indicated that: (1) the shallow groundwater is contaminated with petroleum hydrocarbons, (2) soils near and below the old tetraethyl lead plant are contaminated with lead, (3) on-site pits contain approximately 1,000 cubic yards (yd^3) of sludge containing hazardous substances, and (4) approximately 15,000 yd^3 of on-site subsurface soils are contaminated with petroleum hydrocarbons. These remedial investigations and removal/cleanup of lead-contaminated soils were funded in part by a 1987 RDGP grant (\$300,000).

The purpose of this grant project is to clean up two sludge pits at the Arro site, eliminating potential health and environmental risks. The sludge presents a health hazard to humans who may accidentally come into direct contact with and/or who inhale hazardous vapors volatilized from the sludge. Site access is currently unrestricted; small children or animals may become trapped in the pits. There are carcasses of dead birds and domestic animals already in the large pit. The residents occupying the site have complained of pungent odors during the

warmer months of the year, which indicates they are likely inhaling volatile hazardous substances. The underlying shallow aquifer and soils are already contaminated with the same hazardous substances found in the sludge. The sludge presents an environmental risk because it is a potential source of contamination for an adjacent stream and deep aquifer.

Cleanup would be accomplished in three phases. (1) The feasibility study stage includes conducting a detailed cost-effectiveness evaluation of remedial alternatives and selecting the preferred alternative. This phase also includes conducting any needed lab and field treatability studies. (2) The remedial design stage includes preparing bid specifications and construction plans. (3) The cleanup phase includes soliciting bids, awarding the cleanup contract, and executing the cleanup plan.

The primary objective of remedial activities at the sludge pits is to eliminate the risk of human physical contact and exposure. The secondary objective is to remove the source of environmental contamination and prevent further degradation of groundwater, surface water, and air quality. The grant project would be limited to cleaning up the sludge pits only.

The technologies evaluated centered around removing the liquid and dry sludge from the exposed pits. After removing or stabilizing all usable sludge, clean fill (preferably clay) would be placed in the excavation. Top soil would be placed over the fill and seeded. DHES has proposed 10 possible alternatives to dispose of or find a productive use for the removed material; these alternatives are listed below.

1. Transport the sludge to an industrial facility to be used as fuel.
2. Incinerate the sludge off-site or on-site using a mobile incinerator.
3. Recycle and/or refine the sludge.
4. Use the sludge in road construction.
5. Separate the sludge waste into oil, water, and solid fractions by means of a solvent.
6. Biodegrade the sludge and contaminated soils.
7. Use in situ vitrification (a thermal treatment process that converts contaminated soils into a chemically inert and stable glass by means of heat generated by an electric current).
8. Wash the fine suspended clays from the sludge, through a six-step process, using a hot water extraction method.
9. Stabilize the organic wastes by mixing in a mineral agent.
10. Use a white rot fungi to break down and destroy the sludge hydrocarbons.

TECHNICAL ASSESSMENT:

Technical review of this project was favorable. The applicant has thoroughly researched the alternatives and discussed these with the potential contractors. The current preferred alternative is to recycle and/or refine the sludge. This is the most inexpensive and desirable alternative because the sludge would be reused. The proposal represents a logical and necessary strategy for cleanup of the sludge material.

FINANCIAL ASSESSMENT:

All grant funds would be used strictly for contracted services (i.e., for the cleanup contractor, treatability studies, and oversight consultant). Any costs incurred by the applicants, such as salary, travel, and equipment, would be donated as an in-kind match. Administrative costs were not included in the budget since grant funds would not be used to cover them.

Because the final cleanup alternative has not been selected, a detailed breakdown of contractor expenses was not provided. Estimated total project costs are shown below.

<u>Cleanup contractor costs</u>	
Sludge removal	\$ 20,000
Sludge recycling/cleanup	250,000
Soil replacement and revegetation	5,000
<u>Oversight consultant costs</u>	
Cleanup plan development	5,000
Cleanup oversight and final report	35,000
TOTAL	\$ 315,000

DHES has obtained estimates from contractors where possible. Generally the budget is adequately documented, realistic, and economically feasible. EPA conducted a site investigation and collected data required to rank the site to determine if it qualified for Superfund money. The site's hazardous ranking score was not high enough to qualify for EPA Superfund money. The State Comprehensive Environmental Cleanup and Responsibility Act (CECRA) program does not have adequate funds to address this problem.

ENVIRONMENTAL EVALUATION:

Examination of each of the 10 alternatives proposed for the sludge cleanup is ongoing. The alternative selected would comply with applicable environmental standards and regulations. Contaminated soils would be replaced with clean soils, having a beneficial effect in the cleanup area. Water and air quality

would be improved, since a source of contamination to streams, groundwater, and air would be removed. Also, the site would be revegetated and could be returned to productive agricultural land. No long-term negative impacts are anticipated.

PUBLIC BENEFITS ASSESSMENT:

Six residences and pastureland are currently located on the site. The two sludge pits are currently unrestricted, but elimination of the pits would remove the threat to children, livestock, and wildlife that may become trapped in the pits. Cleanup of the pits would eliminate the threats of (1) hazardous wastes entering surface water and groundwater, and (2) residents inhaling hazardous substances. Some of the wastes have been identified as carcinogens.

Over 10 abandoned refineries in the state of Montana have sludge pits similar to those at the Arro Refinery site. Cleanup procedures and technologies developed for this project could assist with cleanup of the other refinery sites as well as other sites contaminated with petroleum hydrocarbons, offering potential statewide benefits.

RECOMMENDATIONS:

A grant of up to \$300,000 is recommended contingent on DNRC approval of the project scope of work and budget.

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APPLICANT NAME: Montana Board of Oil and Gas Conservation

PROJECT/ACTIVITY NAME: Abandoned Well Plugging Project "A"

AMOUNT REQUESTED: \$ 300,000

OTHER FUNDING SOURCES AND AMOUNTS:

Applicant \$ 6,000

TOTAL PROJECT COST: \$ 306,000

PROJECT DESCRIPTION:

This project addresses a statewide need to reduce the potential adverse impacts of improperly abandoned wells on the water resources, land use, and mineral values of the state. The project reflects the ongoing concern for potential point source degradation of groundwater.

In September 1989 the Board of Oil and Gas Conservation (Board) contracted with the Department of Natural Resources and Conservation's Resource Development Bureau to conduct a search and examination of Board files and electronic databases. The purpose was to compile a list of pre-law (1954) oil and gas wells in need of on-site inspection. Grant applications to the Reclamation and Development Grants Program (RDGP) would be developed to properly abandon those wells that pose the most severe environmental and/or public health hazards.

Several thousand old wells (pre-1954) are in need of field checks. The Board has submitted three applications for RDGP grant funding. In terms of priority the Board rates this proposal over Abandoned Well Plugging Projects "B" and "C" (found elsewhere in this book). Priority was assigned after field inspection and based on the likelihood that a particular well could cause severe groundwater or surface water contamination if left unplugged. The Board has indicated that there is no liable or responsible party for the proposed plugging and surface cleanup.

The proposed project involves the surface preparation of four well-sites, the moving in and rigging up of an appropriately sized drilling or workover rig, the re-entry and drilling or cleaning out of each well to a depth necessary to control any water or hydrocarbon flow, and the setting of cement plugs in the hole or the setting of cast iron bridge plugs in cased portions of the wells. Upon completion of the well work, the surface would be cleaned of debris and drilling materials, pits backfilled and leveled, and the entire area recontoured if necessary. Revegetation of the disturbed area would be accomplished, utilizing seed mixtures appropriate for the area and satisfactory to the landowner.

TECHNICAL ASSESSMENT:

The names and locations of the four wells are:

1. #1 Van Dusen Section 29, T8N, R21E
 Golden Valley County
2. Mitchell #5 Section 21, T15N, R30E
 Petroleum County
3. Haskell #1 Section 4, T14N, R55E
 Dawson County
4. Well #2 Section 26, T8N, R21E
 Golden Valley County

All of the wells listed under this proposed project should be properly abandoned and surface reclamation accomplished as soon as possible. These wells have likely been creating surface

problems and potentially severe groundwater damage for a relatively long period.

The project's final results would be evaluated using the same criteria applied to an oil and gas operator's abandonment operations. To be considered successful, the well must be left in a stable condition downhole, with mechanical or cement plugs preventing fluid migration between porous zones. The surface must be recontoured and revegetated in such a manner that the original contours are approximated to the extent possible and suitable vegetation reestablished to prevent erosion.

FINANCIAL ASSESSMENT:

Each individual well under the project would be scheduled for plugging in the order listed. Generally the wells would be treated separately for project administration purposes, with the remaining unused funds available for the next well on the list following successful plugging of the preceding well(s). While the time allotted for plugging operations is relatively short (e.g., five to ten days), the surface restoration, including revegetation, would be likely to take at least one growing season before a final release of the site could be done.

The costs of plugging are based on the estimated time to plug, the cost of plugging materials, and the cost of dirt work done in preparation for re-entry of the well and restoration of the location upon completion of the project. Third party services, including trucking of water and materials, logging or other wireline services, and renting specialized equipment, such as fishing tools, are also included in the estimate.

While the well plugging projects would generally be undertaken in the order listed, some flexibility to change priorities is needed as well-bore conditions occasionally change dramatically. In some instances it may be necessary to substitute a newly discovered problem well in lieu of or ahead of a well already on the project list. This change in priority may be dictated by the potential for surface water or (especially) groundwater damage; wells would be prioritized based upon the estimated severity of damage likely to occur if the well is left unplugged. In some cases cost estimates may prove inaccurate by the time the well work is scheduled; there is no guarantee that all of the wells listed can be plugged for a cost at or under the maximum approved funding.

As the Board has done in the past, it would use qualified oil-field contractors to perform the well work involved in this project. Selection of the contractor would be on a bid basis and would comply with the statutory requirements for public projects. The contractor would be under the general supervision of the Board's staff, including its petroleum engineer, petroleum

geologist, and environmental coordinator. The Board's chief field inspector would be the overall project manager. The field inspector responsible for the area in which the well is located would be the full-time supervisor assigned to each project well during active drilling operations.

The estimated total cost of \$306,000 is reasonable for the level of work described.

ENVIRONMENTAL EVALUATION:

The proposed project is intended to provide a substantial positive environmental impact; there would be minor, short-term impacts associated with the project. The principal impact would be the short-term impact to air quality due to emissions from rig engines and dust and noise from traffic and dirt work involved in moving equipment to and from the location and in operations. It is anticipated that beneficial impacts would far outweigh any short-term adverse impacts. Non-implementation of this project would permit groundwater contamination to remain unabated.

PUBLIC BENEFITS ASSESSMENT:

The greatest public benefit to be achieved in virtually every case would be the elimination of potentially severe groundwater contamination by non-potable water, lower quality water, or possibly hydrocarbons from deeper formations. In some cases potentially commercial mineral-bearing zones (including oil and gas zones) may be protected from damage by extraneous water and hydrocarbons.

RECOMMENDATIONS:

A grant of up to \$300,000 is recommended for this project contingent upon DNRC approval of the project scope of work and budget. For any wells substituted for the ones listed, the Board must determine that there is no responsible party and submit this determination in writing to DNRC. This requirement shall be met prior to contractor selection.

With the exception of the Board's Abandoned Well Plugging Project "B" and Abandoned Well Plugging Project "C" (found elsewhere in this book), this recommendation assumes that the Board does not receive additional RDGP or RIT funds from the 1991 legislature to plug and restore abandoned well sites. To the extent that the Board receives funds directly from the legislature for these activities, grant funds will be reduced on a dollar-for-dollar basis.

APPLICANT NAME: Montana Board of Oil and Gas Conservation

PROJECT/ACTIVITY NAME: Abandoned Well Plugging Project "B"

AMOUNT REQUESTED: \$ 295,000

OTHER FUNDING SOURCES AND AMOUNTS:

Applicant \$ 6,000

TOTAL PROJECT COST: \$ 301,000

PROJECT DESCRIPTION:

This project addresses a statewide need to reduce the potential adverse impacts of improperly abandoned wells on the water resources, land use, and mineral values of the state. The project reflects the ongoing concern for potential point source degradation of groundwater.

In September 1989 the Board of Oil and Gas Conservation (Board) contracted with the Department of Natural Resources and Conservation's Resource Development Bureau to conduct a search and examination of Board files and electronic databases. The purpose was to compile a list of pre-law (1954) oil and gas wells in need of on-site inspection. Grant applications to the Reclamation and Development Grants Program (RDGP) would be developed to properly abandon those wells that pose the most severe environmental and/or public health hazards.

Several thousand old wells (pre-1954) are in need of field checks. The Board has submitted three applications for RDGP grant funding. In terms of priority the Board rates this proposal higher than Abandoned Well Plugging Project "C" and lower than Abandoned Well Plugging Project "A" (found elsewhere in this book). Priority was assigned after field inspection and based on the likelihood that a particular well could cause severe groundwater or surface water contamination if left unplugged. The Board has indicated that there is no liable or responsible party for the proposed plugging and surface cleanup.

The proposed project involves the surface preparation of three well-sites, the moving in and rigging up of an appropriately sized drilling or workover rig, the re-entry and drilling or cleaning out of each well to a depth necessary to control any water or hydrocarbon flow, and the setting of cement plugs in the hole or the setting of cast iron bridge plugs in cased portions of the wells. Upon completion of the well work, the surface would be cleaned of debris and drilling materials,

pits backfilled and leveled, and the entire area recontoured if necessary. Revegetation of the disturbed area would be accomplished, utilizing seed mixtures appropriate for the area and satisfactory to the landowner.

TECHNICAL ASSESSMENT:

The wells and their locations are:

- | | |
|-----------------|---|
| 1. Well #2 | Section 6, T25N, R24E
Yellowstone County |
| 2. Well #3 | Section 21, T8N, R21E
Golden Valley County |
| 3. No Well Name | Section 21, T15N, R30E
Petroleum County |

All of the wells listed under this proposed project should be properly abandoned and surface reclamation accomplished as soon as possible. These wells have likely been creating surface water problems and potential groundwater damage for a relatively long time.

The project's final results would be evaluated using the same criteria applied to an oil and gas operator's abandonment operations. To be considered successful, the well must be left in a stable condition downhole, with mechanical or cement plugs preventing fluid migration between porous zones. The surface must be recontoured and revegetated in such a manner that the original contours are approximated to the extent possible and suitable vegetation reestablished to prevent erosion.

FINANCIAL ASSESSMENT:

Each individual well under the project would be scheduled for plugging in the order listed. Generally the wells would be treated separately for project administration purposes, with the remaining unused funds available for the next well on the list following successful plugging of the preceding well(s). While the time allotted for plugging operations is relatively short (e.g., five to ten days), the surface restoration, including revegetation, would be likely to take at least one growing season before a final release of the site could be done.

The costs of plugging are based on the estimated time to plug, the cost of plugging materials, and the cost of dirt work done in preparation for re-entry of the well and restoration of the location upon completion of the project. Third party services, including trucking of water and materials, logging or other wireline services, and renting specialized equipment, such as fishing tools, are also included in the estimate.

While the well plugging projects would generally be undertaken in the order listed, some flexibility to change priorities is needed as well-bore conditions occasionally change dramatically. In some instances it may be necessary to substitute a newly discovered problem well in lieu of or ahead of a well already on the project list. This change in priority may be dictated by the potential for surface water or (especially) groundwater damage; wells would be prioritized based upon the estimated severity of damage likely to occur if the well is left unplugged. In some cases cost estimates may prove inaccurate by the time the well work is scheduled; there is no guarantee that all of the wells listed can be plugged for a cost at or under the maximum approved funding.

As the Board has done in the past, it would use qualified oil-field contractors to perform the well work involved in this project. Selection of the contractor would be on a bid basis and would comply with the statutory requirements for public projects. The contractor would be under the general supervision of the Board's staff, including its petroleum engineer, petroleum geologist, and environmental coordinator. The Board's chief field inspector would be the overall project manager. The field inspector responsible for the area in which the well is located would be the full-time supervisor assigned to each project well during active drilling operations.

The estimated total cost of \$301,000 is reasonable for the level of work described.

ENVIRONMENTAL EVALUATION:

The proposed project is intended to provide a substantial positive environmental impact. There would be minor, short-term impacts associated with the project. The principal impact would be the short-term impact to air quality due to emissions from rig engines and dust and noise from traffic and dirt work involved in moving equipment to and from the location and in operations. It is anticipated that beneficial impacts would far outweigh any short-term adverse impacts. Non-implementation of this project would permit groundwater contamination to remain unabated.

PUBLIC BENEFITS ASSESSMENT:

The greatest public benefit to be achieved in virtually every case would be the elimination of potentially severe groundwater contamination by non-potable water, lower quality water, or possibly hydrocarbons from deeper formations. In some cases potentially commercial mineral-bearing zones (including oil and gas zones) may be protected from damage by extraneous water and hydrocarbons.

RECOMMENDATIONS:

A grant of up to \$295,000 is recommended for this project, contingent upon DNRC approval of the project scope of work and budget. For any wells substituted for the ones listed, the Board must determine that there is no responsible party and submit this determination in writing to DNRC. This requirement shall be met prior to contractor selection.

With the exception of the Board's Abandoned Well Plugging Project "A" and Abandoned Well Plugging Project "C" (found elsewhere in this book), this recommendation assumes that the Board does not receive additional RDGP or RIT funds from the 1991 legislature to plug and restore abandoned well sites. To the extent that the Board receives funds directly from the legislature for these activities, grant funds will be reduced on a dollar-for-dollar basis.

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APPLICANT NAME: Montana State Library

PROJECT/ACTIVITY NAME: NRIS Program--Emphasis on the Natural Heritage Program and Geographic Information System (GIS)

AMOUNT REQUESTED: \$ 227,600

OTHER FUNDING SOURCES AND AMOUNTS:

Renewable Resource Development Program (RRD), DNRC	\$ 199,626 (two grants)
Department of Fish, Wildlife and Parks (DFWP)	\$ 50,000
Department of State Lands (DSL) and Office of Surface Mining (OSM)	\$ 30,000

TOTAL PROJECT COST: \$ 507,226

PROJECT DESCRIPTION:

The Montana Natural Resource Information System (NRIS) was created by the legislature in 1985 to improve statewide efforts to manage a growing amount of natural resource data and make existing data sources more accessible. NRIS is designed to ensure the best information is quickly at hand for critical decisions. NRIS has made good progress in meeting the legislative mandate of helping to avoid increasing data collection and management costs, providing assistance in making information technology choices, and aiding data managers hoping

to share information with different departments and public and private data users. This program has provided an increased understanding of the state's natural resources and an increased ability to apply this knowledge to the conservation, management, utilization, development, and preservation of the state's vital resources.

NRIS has organized its efforts into four major components. The Montana Natural Heritage Program (NHP) is a comprehensive, computer-assisted inventory of Montana's biological resources, emphasizing rare, threatened, or endangered plant and animal species and biological communities. In 1990 the Heritage Program has more than 5,000 records in its databases and has been instrumental in land management decision making. The program facilitates economic development, even in environmentally sensitive areas, without causing irreparable damage. The Montana Water Information System (MWIS) provides a starting point for locating water resource information that is contained in the records of several agencies. MWIS is a central contact point for statewide data on surface water, groundwater, water quality, riparian areas, climatic data, and on-line interconnection with all major federal water-related databases. The Montana Geographic Information System (GIS) provides services and technical assistance for statewide GIS projects and to agencies developing in-house GIS capability. NRIS inventories data available for GIS applications, maintains a computerized directory of this data, and coordinates GIS data standards and sharing throughout the state. The Montana Natural Resource Index (NRI) is a geographical and subject area indexing system for existing data sources, including almost 10,000 references to both published and unpublished documents related to natural resource data sources.

Proposed tasks for NRIS are listed below. NRIS requests funds and support for all tasks listed (1 through 9), with primary emphasis on managing and operating the Natural Heritage Program (Task 4), managing and operating the data clearinghouse and response services (Task 5), and developing the GIS (Task 7).

1. Participate in the design and development of uniform, accessible, statewide databases for each of Montana's natural resources
2. Maintain and continue to develop the natural resource index
3. Maintain, refine, and continue to operate the MWIS in cooperation with DNRC
4. Administer the development and operation of the Natural Heritage Program
5. Manage a timely, cost-effective clearinghouse and referral service to link users with the best sources of information

6. Negotiate at least three cooperative agreements with state and federal agencies to secure support for project goals and provide specific data management services consistent with project goals
7. Participate in the design and development of a GIS to serve state needs, promote coordination among Montana state and federal agencies in developing their own GISs, and provide GIS training programs for natural resource personnel
8. Market and promote the use of NRIS and its four main projects
9. Evaluate the programs on an ongoing basis and produce status reports as requested and as specified in various contracts

TECHNICAL ASSESSMENT:

The proposal is well defined. The past success of NRIS can be attributed to two main reasons. First, the program is housed in the Montana State Library, which provides a "neutral corner" to disseminate sometimes controversial information without bias. Second, NRIS decided against the traditional, centralized database approach where users are tied into a single system. The centralized databases are costly and very complex to operate. Instead, NRIS provides a central access point to decentralized data sources, a kind of road map to identify important data sources and easy access. This strategy has enabled each resource agency to manage its own data while allowing for maximum data sharing among participating users. NRIS has often been a critical tool in the management of Montana's natural resources.

FINANCIAL ASSESSMENT:

The total 1992-1993 biennium budget for the entire NRIS program is \$1,187,413, including several task-specific, service contracts for state and federal agencies. Core operating funds to address the scope of work outlined for this grant are projected at \$507,226, of which \$227,600 would be derived from this RDGP grant and spent as shown below.

Salaries	\$ 65,000
Benefits	15,600
Contracted services	136,000
Supplies and materials	1,000
Communications	1,000
Travel	1,000
Rent	1,000
Repair and maintenance	1,000
Other	1,000
Equipment	<u>5,000</u>
 TOTAL	\$ 227,600

Since 1985, the legislature has awarded \$601,138 in RDGP grants to NRIS for various programs. The RDGP is not intended to be a continuous source of funding for long-term projects or programs more appropriately funded through the state budget process (ARM 36.19.105). In light of this, NRIS has pursued several alternatives for a permanent source of funding. The Governor's Office of Budget and Program Planning (OBPP) has recommended a direct appropriation of \$377,000 from the RIT account (FY 92-93). Also, it was recommended that NRIS receive \$100,000 rather than \$50,000 from DFWP. No change was recommended in the \$30,000 grant from DSL/OSM. The OBPP recommended changes meet the \$507,226 needed for NRIS core programs. NRIS plans on withdrawing the RDGP and two RRD grant applications if it receives the entire \$377,000 direct appropriation.

ENVIRONMENTAL EVALUATION:

The proposed project is designed to provide for the long-term management and compilation of information on natural resources on behalf of public and private users. Significant positive impacts are expected to result from the project because of an increased understanding of the state's renewable resources and an increased ability to apply this knowledge to the conservation, management, utilization, development, and preservation of the water, land, vegetation, fish, wildlife, recreational, and other renewable resources in the state. In particular, the project would have the effect of reducing environmental impacts of future natural resource projects statewide.

PUBLIC BENEFITS ASSESSMENT:

The primary benefit of this project is that it would improve access to natural resource data. Accurate, reliable, and adequate natural resource information improves the planning and implementing of development activities that may affect natural resources. This program is accessible to all citizens of Montana and includes data from throughout the state. Benefits would be experienced statewide.

RECOMMENDATIONS:

A grant of up to \$227,600 is recommended contingent on the following.

1. DNRC must approve a detailed scope of work and budget.
2. OBPP has recommended a \$377,000 direct RIT appropriation, \$100,000 from DFWP, and \$30,000 from DSL/OSM. If the full \$377,000 direct RIT appropriation is received, the NRIS request for the RDGP and two RRD

grants will be withdrawn completely. If less than \$377,000 is received, any funding shortfall will be made up first by the RRD grants, and then by the RDGP grant. If the recommended DFWP or DSL/OSM appropriations are reduced, the RRD or RDGP grants will not be used to make up for this shortfall.

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<u>APPLICANT NAME:</u>	Montana Salinity Control Association (MSCA)
<u>PROJECT/ACTIVITY NAME:</u>	Soil and Water Nonpoint Source Pollution Control and Management
<u>AMOUNT REQUESTED:</u>	\$ 275,000 (1993-1994 (biennium)

OTHER FUNDING SOURCES AND AMOUNTS:

Conservation Districts Bureau,	\$ 200,000
DNRC (1993-1994 biennium)	
Landowner contributions (estimated)	\$ 125,750

<u>TOTAL PROJECT COST:</u>	\$ 600,750
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PROJECT DESCRIPTION:

The Montana Salinity Control Association (MSCA), formed in 1985, represents 33 central and eastern Montana counties. A six-member executive board provides supervision and local input to the MSCA field staff. MSCA's principal goals are agricultural nonpoint source pollution (NPSP) prevention, reclamation, and education, along with improvement of agricultural productivity, soil, fauna, and water quality. Educational efforts focus on soil and water conservation practices that benefit the environment, agriculture, fish, wildlife, and the citizens of Montana, as well as surrounding states and Canada.

The MSCA interdisciplinary technical field team has developed a proven reclamation technique utilizing alternatives to summer fallow cropping. The team works on a farm-by-farm basis using hydrogeologic site characterization, recharge area identification, and soil and water quality sampling and monitoring. Emphasis is placed on intensive and alternative cropping systems.

MSCA is requesting funding to initiate fieldwork and planning for 40 new projects. To date, MSCA has completed 319 reclamation plans encompassing 75,000 acres. The average cost

per acre for a reclamation plan was \$112 in 1990. Approximately 35 applications for assistance are currently on file, and new applications are continually being generated. These applications represent a range of entities, including individual farmers, the U.S. Fish and Wildlife Service's Benton Lake Wildlife Refuge near Great Falls, and the City of Havre. Havre requested assistance from MSCA to control and reclaim saline soils, groundwater, and surface water, because they are impacting the business community, fairgrounds, and private land on the west edge of town.

TECHNICAL ASSESSMENT:

The methods to reduce saline seep are sound, well documented, and supported by professionals in this field. MSCA's efforts have been successful in publicizing the causes and costs of saline seep in Montana. MSCA provides a useful service to the public, and the proposal is a legitimate part of Montana's nonpoint source pollution abatement program.

According to MSCA, the reclamation plan implementation rate is 85 percent. The reasons this rate is not higher may be that the solution is labor-intensive, too expensive for some farmers, and requires long-term attention to prevent future seeps. In addition, the alternative agricultural practices used in reclamation result in forage products that are not currently as marketable as the cereal grain crops generally grown in these areas.

FINANCIAL ASSESSMENT:

The breakdown of the RDGP budget request for the proposed fiscal years 1993-1994 is listed below.

Salaries and wages	\$ 100,000
Fringe benefits	10,000
Contracted services	4,000
Supplies and materials	40,000
Communications	10,000
Travel	5,500
Rent and utilities	7,000
Equipment	64,500
Miscellaneous	<u>34,000</u>
 TOTAL	\$ 275,000

Expenditures for supplies and materials include well construction materials, vehicle repairs and operations, and office supplies and repairs. Equipment expenditures include a 4x4 pickup, lap top computer, plotter, image recorder (to make slides from computer graphics), Fax machine, computer software, soil sampling and analysis equipment, well sampling kit, 10 water level recorders, survey equipment, office furniture, and well

construction equipment. Educational materials (displays, tours, video, and bulletins) and insurance comprise the miscellaneous expenses.

The state is asked to contribute 79 percent of the total budget, or 46 percent from RDGP and 33 percent from the Conservation Districts Bureau. RDGP rules state that RDGP is not intended to be a continuous source of funding for costs of long-term projects or programs more appropriately funded through the state budget process (ARM 36.19.105). It is important that MSCA not become too dependent on the grants and move toward becoming more self-sustaining.

MSCA has received three RDGP grants for nonpoint pollution control since 1985. Since 1988, when the first RDGP contract was written, it has spent \$390,620 of the \$650,000 in approved RDGP funds. As of October 1990, MSCA had \$259,380 remaining to spend in currently allotted RDGP funds. MSCA's present RDGP contract requires 30 percent landowner contributions; it should be noted that MSCA has been conscientious about collecting the required landowner match.

ENVIRONMENTAL EVALUATION:

Adverse environmental impacts are not expected to result from this project. The major benefits would be the reclamation and protection of soil and water resources. Improvement of soil resources would result from crop types and rotations that prevent soluble salts and trace minerals from being transported to the upper soil horizon and provide better cover to reduce soil erosion. Water quality would be improved by cropping practices that prevent soluble salts and trace minerals from moving through the soil profile into groundwater and surface water. The perennial crop rotations would also prevent erosion, which would minimize sediment movement to riparian areas. Wildlife would benefit from the increased forage, and aquatic life would profit from the improved water quality.

PUBLIC BENEFITS ASSESSMENT:

Private landowners receive the main benefits from this program through increased production and higher returns from reclaimed lands. Statewide public benefits result from soil and water resource improvements.

RECOMMENDATIONS:

DNRC recommends that half the requested amount be granted. MSCA has already secured RDGP funding to carry it through the 1991-1992 biennium. The recommended amount will allow MSCA to

continue its present level of operation through fall 1993. The amount recommended will enable MSCA to fund its operations until it can secure a more reliable and permanent source of funding.

A grant of up to \$137,500 is recommended contingent on the following.

1. DNRC must approve the project scope of work and budget.
2. The amount must be matched by landowner contributions of at least \$55,000. This equals 40 percent of the recommended RDGP grant.

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APPLICANT NAME: Montana State University (MSU),
Reclamation Research Unit

PROJECT/ACTIVITY NAME: Effect of Sodium, Chlorine, and Total
Salts from Treated Cyanide Solutions on
Soils

AMOUNT REQUESTED: \$ 82,885

OTHER FUNDING SOURCES AND AMOUNTS: None

TOTAL PROJECT COST: \$ 82,885

PROJECT DESCRIPTION:

Heap leach gold extraction with a dilute cyanide solution is rapidly increasing in Montana because of its cost-effectiveness. Under certain climatic conditions heap leach mines release solutions of treated cyanide or sprinkle irrigate treated solutions on forested or rangeland soils. Concern about potential contamination of groundwater or surface water has led to the requirement that all cyanide wastewater be treated and cyanide concentrations reduced to acceptable levels.

Sodium, a metal not often considered toxic, is the dominant metal in cyanide waste streams. Attenuation of sodium by the receiving soil causes an increase in the SAR (sodium absorption ratio) of the material. Large quantities of ionized chlorine will also be found in the solution following oxidation of cyanide. The elevated sodium levels occur because of additions of the element in the extraction process and in cyanide neutralization. Chlorine occurs as a result of the addition of sodium or calcium hypochlorite in the neutralization process.

The salt loading of soils rises very rapidly on land application disposal areas during evaporation of surface-applied

mine wastewater because of the amount of salts in the barren liquid. These salts are a result of additions of cyanide, sodium hydroxide, and sodium or calcium hypochlorite to the heaps or to the treatment solution. These three problems--sodium, chlorine, and salt loading--are now being viewed with as much, if not greater, relevance than cyanide and toxic heavy metals to the land application discharge system.

Land applications of spent cyanide solution are currently controlled by the Hardrock Bureau of the Department of State Lands (DSL). Sodium, salinity, and chlorine are considered when application rates are being evaluated. Unfortunately, little is known of the rate of sodium attenuation, salinity buildup, or chlorine accumulation in soils receiving treated cyanide solutions. Data to help the state regulatory agency set appropriate guidelines are becoming more important with each new precious metal mine permit application.

MSU proposes to evaluate sodium attenuation, salinity buildup, and chlorine accumulation in mine site soils in the laboratory and field. Soil columns would be constructed in the laboratory and field sites instrumented to evaluate treated cyanide solution irrigation upon these three parameters.

Two mine sites would be selected in collaboration with the Hardrock Bureau and mine managers. Soils selected for study would be located in areas designated in the mine permit as land application disposal areas.

TECHNICAL ASSESSMENT:

Sodium is the most common metal in treated waters from cyanide heap leach operations. This metal is derived not from the gold ore but from sodium hypochlorite used to neutralize cyanide and sodium hydroxide added to the neutralizing solution to keep the pH high and prevent the formation of poisonous cyanide gas. Exchangeable sodium percentages are not considered harmful until they reach 10 or 12, but any value above 4 or 5 restricts the number of plant species that will develop and reproduce in a soil. Sodic soils have an excess of exchangeable and soluble sodium which tends to disperse the clay system, resulting in a general loss of soil structure. Such degradation of the soil structure can decrease water infiltration and permeability rates, thereby increasing overland flow and surface erosion. Sodic conditions not only retard seedling establishment, root penetration, and plant growth in general, but also limit the kinds of plants that can be established. Also, direct sodium toxicity may be a problem for sensitive species.

Chlorine is also derived from the hypochlorite and can be as toxic to fish as cyanide. Since 6.8 mg of chlorine are required to completely oxidize one milligram of cyanide and chlorine will

not break down, concentrations of this element in discharge water may be very high. Irrigation water with chlorine concentrations over 500 mg/l is injurious to sensitive species and will tend to exacerbate the salt buildup problem. This element may be present in barren solutions at much greater concentrations than 500 mg/l and pose a greater problem than previously anticipated in land application systems.

Cyanide, metallo-cyanide complexes, calcium or sodium hypochlorite, and sodium hydroxide are added to or result from the addition of other soluble salts to the cyanide solution. These chemical compounds and ions accumulate in the barren liquor. When the solution is applied to soil surfaces, all dissolved salts remain after evaporation of the water. Loading of the soil and its surface organic layer (in forested mountain soils) with anions and cations causes an increase in the EC (electrical conductivity) of the soil. These conductivities may reach levels inhibitory to plant growth and development before toxic metal levels are measurably elevated. Most Montana forest vegetation is salt sensitive, and soils reveal conductivity levels below 1 dS/m. By agricultural standards, soils with an EC greater than 4 dS/m retard plant growth. Actually, salt sensitive plants may be affected at conductivities much less than 4 dS/m.

Mine company data and accidental spills have shown that exchangeable sodium percentages (ESPs), chlorine concentrations, and salinity are all high in land application discharge area soils. No research has been found, however, that addresses these phenomena at heap leach operations.

As long as cyanide heap leach gold extraction continues in Montana, controlled land applications will be needed for the disposal of spent cyanide solutions or excess water containing cyanide. These two actions, heap leaching and disposal of excess solutions, need not conflict with environmental concerns, but regulatory agencies (DSL, Hardrock Bureau) must have data to guide their permitting actions if they are to prevent conflicts. At the present time, regulators must assume a worst case scenario with respect to increasing soil ESP, chlorine, and EC at land application areas. Additional information about these three parameters will help prevent environmental degradation and may permit more liberal land application discharge rates.

There are few alternatives to some sort of research project investigating the impact on soil of sodium, chlorine, and salinity in treated cyanide solutions. Other parameters (i.e., cyanide and heavy metals) have been and are being investigated. It is becoming increasingly apparent that the quantities of sodium, chlorine, and salt in general will become limiting before the two more toxic materials reach levels of concern. Information about cyanide and heavy metals added to soils in

waste solutions will not help define limits to land application discharge systems for sodium, chlorine, and salts.

The proposal represents a logical next step in the investigation of potential impacts to the environment from cyanide heap leach operations.

FINANCIAL ASSESSMENT:

The proposed budget includes:

Salaries and benefits	\$ 60,928
Contracted services	12,772
Supplies and materials	1,500
Communications	300
Travel	4,025
Rent and utilities	2,720
Equipment	<u>640</u>
TOTAL	\$ 82,885

Costs appear reasonable for the work to be performed. The lab work would consist of a soil column study in which neutralized cyanide solutions would be leached through three replicates of two different soil types. Water analyses would be conducted on the effluent from each column. Soil analyses would be conducted on samples taken from several levels within each column after leaching.

The field investigation would be conducted at two discharge sites to be selected when grant funds become available. At each site, four soil cores would be collected, and seven samples would be taken from each core, for a total of 56 separate samples. Cores would be taken during four different sampling times, for a subtotal of 224 samples. Adding these to an estimated 26 soil samples taken from the soil columns in the laboratory brings the grand total to 250 soil samples.

All analyses would be carried out in the reclamation research laboratory at MSU. The soil and water analyses before and after discharge of the treated cyanide solution would be used to interpret the effect of land application of cyanide mine waste solutions on the salt, sodium, and chloride content of the two soil types.

ENVIRONMENTAL EVALUATION:

This study is not likely to result in adverse impacts to the environment. This impact interpretation would enable the Hardrock Bureau to maximize permitted solution discharges without soil degradation and thus make the gold extraction process more economical. Data in the final report would help the Hardrock

Bureau regulate land applications of treated cyanide solutions, spills, and other permitted and accidental discharges of cyanide at heap leach operations.

Final results would consist of rates of loading for land application disposal sites at two heap leach operations in Montana. Project results would be provided to DSL and DNRC.

PUBLIC BENEFITS ASSESSMENT:

Since most of the land involved is public, this project would help ensure that the quality of our public land resource will be maintained for all Montanans. The study would conserve our natural soil resource. Information to be provided by this study would permit the Hardrock Bureau to more accurately predict soil impact resulting from waste cyanide disposal.

The information would also be of value to mine operators. Data on the ability of soils to absorb sodium, chlorine, and salts without reaching levels inhibitory to plant growth would enable the mining industry to more effectively plan land application programs. These data would permit the maximization of discharge with a minimum of environmental damage.

RECOMMENDATIONS:

A grant of up to \$82,885 is recommended for this project contingent upon DNRC approval of the project scope of work and budget.

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APPLICANT NAME: Carbon County, Stillwater County, and the City of Big Timber

PROJECT/ACTIVITY NAME: Integrated Waste Management in Southcentral Montana

AMOUNT REQUESTED: \$ 121,587

OTHER FUNDING SOURCES AND AMOUNTS:

Applicants	\$ 32,700
Soil Conservation Service (SCS),	\$ 45,049
Beartooth RC&D, Keep Montana	
Clean and Beautiful, Midwest	
Assistance Program, and	
Billings Recycling	

TOTAL PROJECT COST: \$ 199,336

PROJECT DESCRIPTION:

The issue of waste disposal is a critical problem for communities all across America. Many landfills are reaching capacity, new sites are difficult to find and expensive to develop, and the new safety standards required because of groundwater pollution are difficult and expensive to meet. The purpose of this project is to develop a model integrated waste management program for Carbon and Stillwater Counties and the City of Big Timber by 1993. This would be accomplished using a strong information and education program to stimulate significant voluntary public participation in recycling, reusing, reducing, and composting of solid waste.

In 1988, the U.S. Environmental Protection Agency (EPA) proposed the "Subtitle D" rules. These rules establish minimum standards for landfilling including location, facility design, closure and postclosure, financial assurance, and groundwater monitoring. Each state will be required to revise its solid waste regulations upon promulgation of the rules by EPA.

Montana's Solid Waste Management Advisory Committee recently recommended to the Environmental Quality Council that the *State Plan for Solid Waste Disposal* be revised. The committee suggested that the updated plan should include assessments of reduction of waste generated at the source, reuse, recycling, and landfill disposal.

Municipal solid waste contains hazardous household and commercial materials that can pollute groundwater. It is estimated that over half of the nation's landfills are leaking. Future costs for land and for the protections necessary to guard against pollution will be higher than they are today. Most of what we throw away is recyclable and has value. Using recycled materials in manufacturing can reduce water use, water and air pollution, and energy use.

The project has three closely related phases: (1) information and education programs, (2) facilities and equipment, and (3) recycling and composting activities. Phase (1) implementation includes enactment of an extensive public education program on the environmental benefits of recycling and the cost savings that would be realized by extending the life of landfills that would otherwise receive this waste. Education efforts would include a travelling display, brochures, flyers used to advertise recycling drives, preparation of a school education lesson on solid waste management, newsletters, and a small incentive/award program. In addition, the project would provide the facilities and equipment to make recycling and composting more economical and convenient. Equipment to be purchased includes six drop-off boxes for the collection of recyclables, a portable baler, a can/glass crusher, a chipper-

composter, and curbside bags. The applicants are working to achieve 90 percent voluntary public participation in six communities with curbside pickup and an 84 percent rate in remaining areas by December 1993.

The solid waste management efforts would be headed up by a three-county solid waste and recycling committee composed of representatives from cities, counties, solid waste districts, the general public, and the Beartooth Resource Conservation and Development Area. Technical and administrative assistance would come from the Beartooth Resource Conservation and Development Area, with additional technical assistance from Keep Montana Clean and Beautiful and the Midwest Assistance Program. Billings Recycling would act as broker for recyclables.

The results of this project could be used by state agencies, legislators, and local officials from around the state who are interested in developing programs in other communities. The results could also help in updating the *State Plan for Solid Waste Disposal*.

TECHNICAL ASSESSMENT:

The crucial state need for this proposal is documented by the Solid and Hazardous Waste Bureau of the Department of Health and Environmental Sciences (DHES). The Montana Environmental Quality Council (EQC) is also very interested in supporting local efforts to reduce and recycle solid waste and expresses the need for a successful "model" integrated waste management program that could be adopted by other communities in the state.

The project is an impressive cooperative effort between local government, quasi-public bodies, and private entities seeking to reduce the amount of waste entering area landfills. Public education is a major prerequisite to achieving this objective, and the project sponsors adequately emphasize the importance of this aspect in changing public attitudes regarding solid waste management. The proposal also acknowledges the need for a paid coordinator to oversee the project.

The proposal lacks detail in several areas, however. First, there is uncertainty regarding the composting of waste presently entering area landfills and how large a component of this waste load is subject to reduction through recycling and composting. Second, little attention is given to defining the market for recyclables that would be collected through the drives and curbside pickup programs. Household hazardous wastes are also mentioned, but no strategy is set forth to deal with this waste component. In summary, there is some question whether sufficient technical and strategic planning has been conducted "up-front" to support the full-scale program proposed here.

FINANCIAL ASSESSMENT:

The budget is well documented. Total project costs are estimated at \$199,336 of which \$121,587 is requested by this grant proposal. Employing a half-time solid waste/recycling coordinator for the two and one-half year period would use \$18,200 of the grant money. Grant expenditures for supplies, materials, and communications are estimated at \$970; \$10,367 would be used to pay for displays and printed materials. Remaining grant funds would be used to purchase six drop-off boxes for \$12,000, a portable baler for \$5,100, a can/glass crusher for \$3,900, a chipper/composter for \$21,000, and curbside bags for \$50,050.

The project sponsors would contribute \$28,800 in salaries and benefits for two part-time solid waste district employees and \$3,900 for operation and maintenance of purchased equipment.

Other sources of matching dollars include the part-time services of the Beartooth Resource Conservation and Development Area coordinator and secretary, a public information specialist from the U.S. Soil Conservation Service, and Recycling Committee staff members. Several hours of assistance per month from Keep Montana Clean and Beautiful, the Midwest Assistance Program, and Billings Recycling are also identified. Other contributions include a \$2,000 trailer donated by a local grocery store owner for the drop-off boxes.

ENVIRONMENTAL EVALUATION:

This project has the potential to greatly enhance environmental quality by reducing solid waste and the number of landfills. Reprocessing recycled goods would reduce energy needs, water use, and pollution. No adverse impacts are anticipated.

PUBLIC BENEFITS ASSESSMENT:

The public would benefit economically and aesthetically by recycling. Economic benefits would be significant to communities by extending the life of present landfills and reducing the size needed in the future.

RECOMMENDATIONS:

DNRC recommends a grant in the amount of \$45,437, contingent on DNRC approval of the project scope of work and budget. Grant funds may be used for the salaries and operating costs outlined in the proposal. The remaining funds must be spent to purchase informational materials to develop and implement a public information campaign on the methods and benefits of recycling and

composting, conduct recycling drives, buy drop-off boxes needed to establish a permanent drop-off system for recyclables, and purchase a can/glass crusher.

This project was also submitted for grant funding under the Renewable Resource Development Program. Funding of the project under one program will preclude funding under the other.

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APPLICANT NAME: Montana Department of Health and Environmental Sciences (DHES), Water Quality Bureau

PROJECT/ACTIVITY NAME: Nonpoint Pollution Control Project in Montana

AMOUNT REQUESTED: \$ 293,240

OTHER FUNDING SOURCES AND AMOUNTS:

Conservation Districts	\$ 1,680
Applicant	\$ 164,550
DNRC, Conservation Districts Bureau (CDB)	\$ 14,920
U.S. Environmental Protection Agency (EPA) (proposed)	\$ 397,180
Private landowners	\$ 65,700
Soil Conservation Service	\$ 52,800

TOTAL PROJECT COST: \$ 990,070

PROJECT DESCRIPTION:

The quality of Montana's waters has been substantially impacted by pollution originating from two major sources: point sources such as pipe discharges from municipal or industrial sources, and nonpoint sources (NPS) from diffuse origins. Nonpoint source pollution is normally associated with agriculture, forestry, mining, construction activities, hydromodification, and urban runoff. Reduction of nonpoint sources of pollution has been difficult to achieve. Nonpoint source pollution currently accounts for an estimated 95 percent of the total water pollution in Montana, according to the report *Montana Water Quality* (DHES, Water Quality Bureau, May 1986). The beneficial uses of over one-third of Montana's streams are severely or moderately impacted by nonpoint source pollution. An additional one-third of our streams have been impaired to a lesser degree, and nearly two-thirds of our lakes and reservoirs are threatened by nonpoint source pollution.

The objective is to continue a statewide management program to control nonpoint source pollution in Montana. With program funding, sites can be selected and projects implemented to demonstrate best management practices (BMPs) to control nonpoint source pollution. Educational programs can also be conducted to inform landowners and land managers of the results of various practices and their applicability to various conditions. The demonstration projects will reduce the total nonpoint source pollution statewide by only a fraction. The associated education programs will publicize the results of these control efforts. Landowners will be able to see the benefits of implementing similar cost-effective projects on their private lands and may then adopt these practices as part of their operations.

In order for a site to be selected for a demonstration project, the streams must receive a high priority ranking from the Nonpoint Source Task Force and be listed in the *Montana Nonpoint Source Assessment Report, 1988* (DHES, Water Quality Bureau). Projects that are being considered for prioritization as demonstration projects are as follows:

Big Spring Creek in Fergus County
Beaver Creek in Hill County
Big Otter Creek in Judith Basin and Cascade Counties
Butcher Creek in Carbon County
Godfrey Creek in Gallatin County (Phase 2)
Libby Creek in Lincoln County

These projects mainly demonstrate BMPs to reduce nonpoint source pollution from agriculture because nearly half of this type of pollution is caused by agricultural activities.

BMPs may consist of practical planning--for instance, recognizing fragile soils or unstable hill slopes and not developing them or developing with special protective measures. In those instances where resource damage occurs, BMPs may include structural (such as revetment, sediment traps) and nonstructural (such as revegetation, irrigation water management, grazing management), site-specific remedial measures. BMPs selected for each project will necessarily be site-specific. The projects implemented will concentrate primarily on practices to improve or protect the stream and riparian zone as those areas are the key to nonpoint source management activities. Upland areas may receive attention on a site-specific basis as needed to produce favorable results.

Educational materials (including videos and literature) on nonpoint source pollution will be developed and an educational program conducted statewide. The applicant proposes to incorporate these materials into the following types of activities: teacher training, youth camps and groups, county

fairs, and CD supervisor workshops. Project sponsors expect that this effort will result in increased public awareness and widespread voluntary implementation of BMPs.

TECHNICAL ASSESSMENT:

The proposal emphasizes a positive, cooperative interagency approach to controlling nonpoint source pollution. Public education and awareness of nonpoint source pollution and how to prevent it are crucial to any control effort. Resourceful farmers and ranchers are much more likely to implement BMPs if they see the results firsthand.

Although reviewers were generally supportive of this proposal, there was one criticism: there is no description of the six demonstration projects. The proposal doesn't give specifics as to what actions will be taken, how much they will cost, and when the projects will be completed. DHES, Water Quality Bureau has explained, however, that specific work plans will be developed for each project upon the obligation of grant funds.

FINANCIAL ASSESSMENT:

The RDGP budget breakdown is shown below.

Salaries and wages	\$ 13,440
Employee benefits	1,008
Contracted services	143,260
Supplies and materials	118,260
Communications	2,500
Travel	2,772
Equipment	<u>12,000</u>
TOTAL	\$ 293,240

Landowners would be asked to contribute 25 percent of the funding for demonstration projects; this contribution could be in the form of labor and in-kind services. Costs of the demonstration projects were based on the average cost of projects currently online, rather than on the actual costs of the six proposed projects.

RDGP funds would serve as leverage for matching funds under Section 319 of the Federal Water Quality Act administered by EPA. Section 319 matching funds are available at 60 percent federal match for 40 percent state or private match. If no state matching funds are available, federal funding for management of nonpoint source pollution will be more difficult to obtain.

DNRC's Conservation Districts Bureau received a RDGP grant in 1989 for nonpoint source pollution control in Montana. The contract for this \$262,573 grant is currently being drafted. DNRC and DHES, Water Quality Bureau are working cooperatively on that grant.

ENVIRONMENTAL EVALUATION:

The project should have positive statewide benefits. The main effect would be water quality improvement. The major component is the potential reduction in streambank soil erosion through voluntary landowner implementation of best management practices on cropland and range.

PUBLIC BENEFITS ASSESSMENT:

The implementation of the proposed management plan would improve water quality through the implementation of nonpoint source control demonstration projects and educational programs and the subsequent adoption of BMPs by private landowners. Improved water quality through the reduction of nonpoint source pollution would decrease the costs of treatment of drinking water, increase the value of water resources for recreational and commercial activities, and reduce the human health hazard from several pollutants.

The degree to which the resource quality would be improved is difficult to judge and would depend mainly upon the success of the demonstration projects and voluntary adoption of BMPs by landowners. The improvement to water quality is expected to be significant in the long term.

RECOMMENDATIONS:

DNRC recommends that half the requested amount be granted. DNRC's Conservation Districts Bureau has been awarded a 1989 RDGP nonpoint pollution grant for \$262,573; this contract is currently being drafted. Coupled with the current request this funding will allow DHES to continue work on demonstration projects through the 1993 fiscal year.

A grant of up to \$146,620 is recommended contingent upon DNRC approval of the project scope of work and budget.

APPLICANT NAME: Montana Bureau of Mines and Geology
(MBMG)

PROJECT/ACTIVITY NAME: Downhole Geophysical Logging Techniques
Applied to Cased Water Well or Monitor
Well Completion

AMOUNT REQUESTED: \$ 39,749

OTHER FUNDING SOURCES AND AMOUNTS:

Applicant \$ 17,067

TOTAL PROJECT COST: \$ 56,816

PROJECT DESCRIPTION:

Well completions are regulated by state law in order to protect both groundwater resources and the groundwater users. Improper well completions typically allow degradation to occur in one or more aquifers. Poorly placed or designed perforated zones or inadequate annular seals can allow water to migrate from a shallow aquifer to a deeper one, or water under artesian pressure can flow up the well to a shallower aquifer or to the surface. Mixing waters of different chemistries will cause degradation of one or the other aquifer. Surface water (such as runoff during a rainstorm) entering a well can cause turbidity problems and carry coliform, heavy metals, pesticides, herbicides, and other contaminants. Once an aquifer has become contaminated, cleanup can be nearly impossible. Successful groundwater protection involves avoiding contamination.

This project would attempt to develop the necessary technology to investigate well completions in the field using downhole geophysical tools. The project would consist primarily of two parts: (1) laboratory trials to determine the most likely geophysical techniques, and (2) field trials to confirm those techniques. The laboratory portion of the project would consist of bench testing several geophysical tools in several lithologic settings. The controlled laboratory environment would allow careful calibration of the tools and a selection of the most appropriate methods. Utilizing these less expensive trials should reduce the number of methods examined in the field trials.

The field portion of the project would involve drilling several shallow holes in two lithologic settings. Wells would be constructed in these holes using several standard completion methods. These holes would be logged, using the methods chosen in the laboratory trials, both before and after the casing and

annular seal were emplaced. These results would be used to further develop and describe the usability of the geophysical tools for identifying well completions.

The final step in the field trial would be to test the techniques on several commercially drilled and completed wells. This would be done in conjunction with a local driller during routine construction of standard water wells. This would be a blind test, meaning the investigators would not have prior knowledge about the completion methods used by the driller.

TECHNICAL ASSESSMENT:

The goals of the project are basically three-fold: (1) detect the type of completion method used in a well, (2) locate the perforations, and (3) determine if the completion seal is complete. Although the wire-line tools chosen for this project should show usable results for the detection of the completion method under certain situations, the tools may prove inadequate for determination of perforation location and success of the seal.

Current oil-field technology can detect movement of fluids and effectiveness of annular seals. These methods include cement bond logs (an acoustic device), cement evaluation logs (directional acoustic/density device), a new oxygen-activation logging device, and injection of short half-life compounds in conjunction with gamma ray readings. Because of high cost only the injection of radioactive fluids and cement bond logs may be usable in the groundwater industry. The cost-effectiveness of these devices should be examined in this study.

The proposal is important because aquifer protection is critical, and this project will potentially indicate a low-cost means of detection of problem wells. It would be an important step in improving techniques used in water well and monitoring well completions with the addition of other logging tools to the study. The Board of Water Well Contractors and the Water Quality Bureau of the Department of Health and Environmental Sciences (DHES) strongly support the study.

FINANCIAL ASSESSMENT:

The project budget is designed for a one and one-half year study with laboratory time and one full field season. The project would require a total of 10 months of professional time, plus up to 300 hours of part-time student help for material handling and record keeping. Of the 10 months professional time, 8 months would be spent on design, implementation, and reporting, and 2 months would be spent administering the project. Students would be hired through their respective schools and would be paid \$6.50 per hour.

The geophysical specialist is intended to be contracted for the project through the Montana Department of State Lands (DSL). The geophysical specialist costs listed for this contract include salary and benefits. Drilling would be contracted at \$5.00 per hour for 160 feet, plus redrilling for hole abandonment, for a total of 320 feet. Additional drill rig costs are for mobilization and rig time, especially during hole abandonment. Geophysical tool rental is for a staffed logging truck. The budgeted cost is based on phone conversations with a geophysical logging company. The quoted rate was \$385 per day for field trials and \$300 per day for lab trials. If state-owned geophysical logging equipment becomes available at a savings to the project, it would be utilized.

The casing and plugging costs are based on current prices for PVC and bentonite. The budgeted amount includes material for permanent hole abandonment.

Travel costs reflect travel to field sites and for materials acquisition in the Billings area. No overnight travel is anticipated. Mileage is figured on a state rate of \$0.40 per mile and 2,500 miles.

MBMG will commit \$17,067 to provide salary, benefits, and indirect costs (figured at 30 percent of salary, wages, and benefits). The remaining funds, \$39,749, would be provided by RDGP.

ENVIRONMENTAL EVALUATION:

The project itself would have a minimal impact on the natural environment, limited to the field phase of the research. Surface disturbance would be minimized and the sites fully reclaimed upon completion of the project. The test wells would be properly abandoned following DSL and DNRC standards.

The project has a definite use in preventing, mitigating, and repairing potential or actual damage to groundwater resources that might result from improper or flawed completion of monitor wells drilled for mineral development.

PUBLIC BENEFITS ASSESSMENT:

The goal of the project is to produce a "cookbook" for the use and interpretation of selected downhole geophysical techniques to determine cased-well completions in water wells and monitor wells, with a discussion of the strengths and weaknesses of the various techniques. If success is achieved, MBMG will have produced a reliable, cost-effective approach for verifying or evaluating well completion. This approach could be utilized by state agencies (DNRC, DSL, MBMG, DHES) in a variety of roles:

to support research efforts, resolve potential human health problems, assist in regulatory analysis or enforcement, etc. Private industry, including logging companies and well drillers, would also use the techniques developed.

The project can help to ensure the quality of the groundwater resource in the state by providing an effective, reliable means of verifying proper well completion and identifying improper completion situations.

RECOMMENDATIONS:

A grant of up to \$39,749 is recommended for this project contingent upon the following.

1. DNRC must approve the project scope of work and budget.
2. MBMG must evaluate the applicability of other tools--e.g., radioactive fluids and cement bond logs--to this study.

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APPLICANT NAME: Montana Board of Oil and Gas Conservation

PROJECT/ACTIVITY NAME: Abandoned Well Plugging Project "C"

AMOUNT REQUESTED: \$ 144,000

OTHER FUNDING SOURCES AND AMOUNTS:

Applicant	\$ 20,000
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<u>TOTAL PROJECT COST:</u>	\$ 164,000
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PROJECT DESCRIPTION:

This project addresses a statewide need to reduce the potential adverse impacts of improperly abandoned wells on the water resources, land use, and mineral values of the state. The project reflects the ongoing concern for potential point source degradation of groundwater.

In September 1989 the Board of Oil and Gas Conservation (Board) contracted with the Resource Development Bureau of the Department of Natural Resources and Conservation (DNRC) to conduct a search and examination of Board files and electronic databases. The purpose was to compile a list of pre-law (1954) oil and gas wells in need of on-site inspection. Grant applications to the Reclamation and Development Grants Program (RDGP) would be developed to properly abandon those wells that pose the most severe environmental and/or public health hazards.

Several thousand old wells (pre-1954) are in need of field checks. The Board has submitted three applications for RDGP grant funding. In terms of priority the Board rates this proposal lower than Abandoned Well Plugging Projects "A" and "B" (found elsewhere in this book). Priority was assigned after field inspection and based on the likelihood that a particular well could cause severe groundwater or surface water contamination if left unplugged. The Board has indicated that there is no liable or responsible party for the proposed plugging and surface cleanup.

The proposed project involves the surface preparation of six well-sites, the moving in and rigging up of an appropriately sized drilling or workover rig, the re-entry and drilling or cleaning out of each well to a depth necessary to control any water or hydrocarbon flow, and the setting of cement plugs in the hole or the setting of cast iron bridge plugs in cased portions of the wells. Upon completion of the well work, the surface would be cleaned of debris and drilling materials, pits backfilled and leveled, and the entire area recontoured if necessary. Revegetation of the disturbed area would be accomplished, utilizing seed mixtures appropriate for the area and satisfactory to the landowner.

TECHNICAL ASSESSMENT:

The names and locations of the six wells are:

1. Mason 20-7 Section 20, T29N, R50E
Roosevelt County
2. Clark 20-9 Section 20, T29N, R50E
Roosevelt County
3. McCall #2 Section 24, T11N, R30E
Madison County
4. Graves #1 Section 24, T11N, R30E
Musselshell County
5. N.P. #1 Section 21, T9N, R23E
Musselshell County
6. Well #1 Section 7, T25N, R24E
Yellowstone County

All of the wells listed under this proposed project should be properly abandoned and surface reclamation accomplished as soon as possible. These wells have likely been creating surface problems and potential groundwater damage for a relatively long time.

The project's final results would be evaluated using the same criteria applied to an oil and gas operator's abandonment operations. To be considered successful, the well must be left in a stable condition downhole, with mechanical or cement plugs preventing fluid migration between porous zones. The surface must be recontoured and revegetated in such a manner that the original contours are approximated to the extent possible and suitable vegetation reestablished to prevent erosion.

FINANCIAL ASSESSMENT:

Each individual well under the project would be scheduled for plugging in the order listed. Generally the wells would be treated separately for project administration purposes, with the remaining unused funds available for the next well on the list following successful plugging of the preceding well(s). While the time allotted for plugging operations is relatively short (e.g., five to ten days), the surface restoration, including revegetation, would be likely to take at least one growing season before a final release of the site could be done.

The costs of plugging are based on the estimated time to plug, the cost of plugging materials, and the cost of dirt work done in preparation for re-entry of the well and restoration of the location upon completion of the project. Third party services, including trucking of water and materials, logging or other wireline services, and renting specialized equipment, such as fishing tools, are also included in the estimate.

While the well plugging projects would generally be undertaken in the order listed, some flexibility to change priorities is needed as well-bore conditions occasionally change dramatically. In some instances it may be necessary to substitute a newly discovered problem well in lieu of or ahead of a well already on the project list. This change in priority may be dictated by the potential for surface water or (especially) groundwater damage; wells would be prioritized based upon the estimated severity of damage likely to occur if the well is left unplugged. In some cases cost estimates may prove inaccurate by the time the well work is scheduled; there is no guarantee that all of the wells listed can be plugged for a cost at or under the maximum approved funding.

As the Board has done in the past, it would use qualified oil-field contractors to perform the well work involved in this project. Selection of the contractor would be on a bid basis and would comply with the statutory requirements for public projects. The contractor would be under the general supervision of the Board's staff, including its petroleum engineer, petroleum geologist, and environmental coordinator. The Board's chief field inspector would be the overall project manager. The field

inspector responsible for the area in which the well is located would be the full-time supervisor assigned to each project well during active drilling operations.

The estimated total cost of \$164,000 is reasonable for the level of work described.

ENVIRONMENTAL EVALUATION:

The proposed project is intended to provide a substantial positive environmental impact; there would be minor, short-term impacts associated with the project. The principal impact would be the short-term impact to air quality due to emissions from rig engines and dust and noise from traffic and dirt work involved in moving equipment to and from the location and in operations. It is anticipated that beneficial impacts would far outweigh any short-term adverse impacts. Non-implementation of this project would permit groundwater contamination to remain unabated.

PUBLIC BENEFITS ASSESSMENT:

The greatest public benefit to be achieved in virtually every case would be the elimination of potentially severe groundwater contamination by non-potable water, lower quality water, or possibly hydrocarbons from deeper formations. In some cases potentially commercial mineral-bearing zones (including oil and gas zones) may be protected from damage by extraneous water and hydrocarbons.

RECOMMENDATIONS:

A grant of up to \$144,000 is recommended for this project, contingent upon DNRC approval of the project scope of work and budget. For any wells substituted for the ones listed, the Board must determine that there is no responsible party and submit this determination in writing to DNRC. This requirement shall be met prior to contractor selection.

With the exception of the Board's Abandoned Well Plugging Project "A" and Abandoned Well Plugging Project "B" (found elsewhere in this book), this recommendation assumes that the Board does not receive additional RDGP or RIT funds from the 1991 legislature to plug and restore abandoned well sites. To the extent that the Board receives funds directly from the legislature for these activities, grant funds will be reduced on a dollar-for-dollar basis.

APPLICANT NAME: Toole County
PROJECT/ACTIVITY NAME: North Toole County Reclamation Project

AMOUNT REQUESTED: \$ 298,966

OTHER FUNDING SOURCES AND AMOUNTS:

Applicant	\$ 21,153
<u>TOTAL PROJECT COST:</u>	\$ 320,119

PROJECT DESCRIPTION:

In northern Toole County, extensive development of oil production facilities began in 1922. It is estimated that several thousand wells were drilled prior to 1954, when regulations for management of the Kevin-Sunburst Field became effective. Frequently, well placement was 10 wells per 40 acres over a total area of about 13,000 acres. There were no regulations at that time addressing environmentally safe methods for disposal of waste oil and brines. Therefore, these wastes were commonly dumped on the land surface. Also, as oil production decreased, the population declined, leaving many facilities abandoned.

The result today is the presence of dilapidated structures and the remains of production equipment scattered over the land. Soils contaminated by past dumping of wastes remain unproductive. The condition of this oil field is a threat to public health, soil productivity, water quality, and economic opportunity in the area. Removal of structural debris and reclamation of impacted soils are needed.

The objectives of this ongoing project are to continue inventory and assessment of sites needing reclamation work, characterize groundwater quality in the area, accomplish removal and burial of abandoned buildings and equipment, continue soil reclamation research, and implement research results.

To date, cleanup has been accomplished at 20 sites. Soil reclamation research has been initiated at two of the sites. Monitoring of these two sites would continue, and the most effective treatments would be applied to larger areas at new sites. Abandoned debris and structures have been removed from 3,080 acres, more or less. Money available through a 1989 RIT grant will be spent on inventory and reclamation of additional sites.

The North Toole County Reclamation Project is administered by a five-member board representing agricultural and oil industry interests. The reclamation strategy includes site assessment, removal and burial of structures and debris (performed by contracts awarded through public bid), drilling of monitoring wells, and application of soil treatments, with reseeding as necessary. A final product of this project will be a reclamation planning guide that will be applicable to similar sites in Montana.

TECHNICAL ASSESSMENT:

Over 13,000 acres of northcentral Toole County contain refuse, equipment, machinery, vehicles, and dwellings abandoned as a result of diminished oil and gas exploration, extraction, and processing. In addition, oil-saturated soils, sludge pits, and wastewater (brine) sites have contaminated groundwater supplies, thereby preventing revegetation and creating an aesthetically unpleasant appearance. In most cases, present landowners are not responsible for this situation and do not own the oil and gas leases on their land. Parties who are legally responsible for the condition of these sites are either disbanded companies or deceased individuals. Agricultural producers lack venture capital to remove hazardous dwellings and equipment on owned or leased lands. The project area is in an economically depressed area with a severely deteriorating infrastructure and high unemployment. Additionally, the dilapidated structures are a safety hazard for those working in and around these sites. Hazardous wastes associated with oil extraction and processing, though undocumented to date, may also be present.

Because equipment and structures are often scattered, potential land uses in the area are severely limited. The debris causes injury to cattle and damage to farm equipment, preventing agricultural use of these lands. Debris removal is needed to allow diversification of land use, which will improve property values.

Oil and brine wastes that have been dumped on the ground impact soil productivity and affect groundwater and surface water quality. Oil-contaminated soils usually have surface oil crusts that eliminate vegetative growth. Methods of restoring productivity to these sites are needed. Shallow groundwater supplies contaminated by indiscriminate dumping of oil-field wastes differ from naturally salinized groundwater supplies in terms of water chemistry (chloride-rich oil-field brines versus sulfate-rich natural conditions), and this requires some modification of standard reclamation practices. In addition, the chlorine-rich brines accentuate the health hazards to humans and livestock. Over the years, local ranchers have reported numerous deaths of cattle attributed to ingestion of contaminated water supplies. Many producers have discontinued livestock

production due to lack of quality water. Also, altered feeding and watering habits have been imposed on local wildlife due to contaminated water supplies.

Isolated sand and gravel lenses within the glacial till provide domestic quantities of potable water, but are usually limited in areal extent and distribution. A region-wide degradation of shallow groundwater quality is evidenced by the increasing presence of saline seep. As more of the domestic and livestock wells are lost due to contamination from oil-field brines, the alternatives for potable water are seen to be very scarce or very expensive.

In summary, the reclamation and cleanup methods proposed represent a logical and necessary approach to the problem of lands adversely impacted by past oil-field production. Continued project coordination with Montana State University, Soil Conservation Service, Montana Salinity Control Association, local extension service, landowners, industry, and others is vital to project success.

FINANCIAL ASSESSMENT:

Relative to Toole County's 1990 reclamation costs, the budget proposal is excessive. Since the inception of the North Toole County Reclamation Project in 1987, 3080 acres (20 sites) have been reclaimed at a cost of \$257,072 (\$83.46/acre). Although the overall project cost per acre is not usually high (especially when compared to coal or metal mine reclamation, for instance), the current construction budget is significantly out of proportion to previous work. For example, construction costs for the second grouping of sites bid (1990 Group II), involving approximately 760 acres, averaged \$83.38/acre. The current proposal lists less acreage (520 acres) and less severe site conditions at a construction cost of \$371/acre, or a total of \$192,920. The need for the increased expenditure of \$288/acre is not apparent.

Unless additional sites are added to the current proposal, a more realistic estimate of construction costs--i.e., design, inspection, and construction--would be in the \$65,000 to \$70,000 range.

In light of the balance remaining from previous grants which is yet (as of October 1990) untargeted for expenditure, it would be advisable to decrease the amount requested rather than add additional sites at this time.

The following RDGP grants have been awarded previously:

<u>Year</u>	<u>Grant Award</u>	<u>Remaining Balance</u>
1985	\$298,130	\$27,581
1987	\$150,000	\$93,744
1989	\$300,000	\$300,000

Other costs--i.e., salaries and wages (\$7,150), supplies and materials (\$1,000), communications (\$1,200), travel (\$5,350), and sampling/drilling (\$11,000)--are reasonable and proportional to the activities proposed. The county is contributing \$21,153 for in-kind services.

These administration costs and the adjusted construction cost would reduce the RDGP funding needed to \$105,000 (which includes a 10 percent contingency).

ENVIRONMENTAL EVALUATION:

Minor short-term impacts, primarily noise, dust, soil compaction, and vegetative disturbance, are associated with project construction activities. Considering the expected benefits of soil and water quality improvement, creation of wildlife habitat, and improved aesthetics over the long term, the net environmental impact is beneficial.

PUBLIC BENEFITS ASSESSMENT:

Public benefits include reduced health and safety hazards, improved quality of soil and water resources, and enhanced economic opportunity on reclaimed lands. A systematic, logical approach to abate the adverse impacts created by abandoned oil and gas operations benefits all Montanans.

RECOMMENDATIONS:

A grant of up to \$105,000 is recommended for this project contingent upon the following.

1. DNRC must approve the project scope of work and budget.
2. The project must be coordinated closely with the Department of Health and Environmental Sciences' Solid and Hazardous Waste Bureau.

APPLICANT NAME: Pesticide County Cleanup Committee

PROJECT/ACTIVITY NAME: Pesticide Contamination Cleanup

AMOUNT REQUESTED: \$ 300,000

OTHER FUNDING SOURCES AND AMOUNTS:

Applicant	\$ 25,000
Department of Health and Environmental Sciences (DHES)	\$ 15,000

TOTAL PROJECT COST: \$ 340,000

PROJECT DESCRIPTION:

The Pesticide County Cleanup Committee (PCCC), a coalition of five Montana counties, is proposing a project to clean up pesticide-contaminated soils at three rural airports and two weed control districts in Montana. Pesticide-contaminated soils at all of these sites and groundwater contamination at one site pose potential health and environmental problems to the population and/or surrounding environment. Tetra-dioxin (2,4-D), found at one site, is the most toxic chemical known--a potent carcinogen. Some of the other pesticides found (DDT, Dieldrin, and Endrin) have been banned because of their toxicity. The Joliet site is ranked first because it has the worst contamination problem. The other four sites are not ranked because they are all very similar. The site names and locations are:

Carbon County Weed Control District - Joliet
Geraldine Airport - Chouteau County
Lake County Weed Control District - Ronan
Miles City Airport - Custer County
Richey Airport - Dawson County

This is a three-phase project. The first phase involves investigation of the sites to further evaluate the nature and extent of the contamination. The second phase involves evaluation of cleanup actions based on a health and environmental risk assessment; this is considered the remedial investigation and feasibility stage. The third phase of the project would be implementation of cleanup measures.

In 1989, a \$150,000 RDGP grant was given to DHES, in association with PCCC, to complete the first two phases of the cleanup project. This project was put under contract in April 1990. The contamination investigation, treatability studies, and remedial investigations are currently under way. A white rot fungus degradation alternative looks the most promising. Using

the white rot fungi is a bioremediation technique that decomposes the contaminants without removal and transport of the soil and requires minimal maintenance.

As owners of the airport properties or operators of the weed control districts, the counties are liable parties at all sites. Although Chouteau, Dawson, and Custer Counties didn't contribute to the contamination problems at the airports, the applicators who did are deceased, not financially viable, or cannot be located. All five sites have pesticide-contaminated soils resulting from improper waste disposal and chemical storage and handling. The contamination problems resulted from historical operations, not current operations. Management practices have been instituted to prevent further contamination of the sites still in use. The counties that own and/or operate the sites have inherited the responsibility to clean up the contamination and need the financial assistance this project would provide. Cleanup costs are prohibitive for these counties, would require special mill levies, and most likely would drain the weed control budgets. Also, cleanup would take years to accomplish due to lack of funding.

TECHNICAL ASSESSMENT:

The problem and project are well documented. Preliminary sampling indicates contamination with health and safety risks at all sites. The 1989 RDGP grant provided funding to investigate the nature and extent of contamination at each site and to evaluate the cleanup alternatives for each site. All appropriate alternatives are being considered and will be selected after completion of the 1989 RDGP grant. The bioremediation alternative--i.e., white rot fungus--is the preferred alternative at present, mainly because it is the most cost-effective. The final assessment of this alternative will be completed in November 1990. The 1991 RDGP funds would be used exclusively for cleanup of the sites.

The methodology proposed is consistent with Montana Comprehensive Environmental Cleanup and Responsibility Act procedures governing remedial actions at sites containing hazardous substances. The proposed remedial action would comply with established cleanup standards, be cost-effective, adequately protect health and the environment, be permanent, and use innovative technology to the extent practicable. In that the project involves the remediation of sites where hazardous wastes or regulated substances threaten public health or the environment, it would be an appropriate use of RDGP funds.

FINANCIAL ASSESSMENT:

The applicant was not able to provide a detailed breakdown of the budget. A \$300,000 sum is shown under contracted services. This was acceptable because cleanup alternatives have not yet been selected. Also, the general surface areas of soil contamination are known, but the depths of the contamination are unknown. Sampling of the contaminated soil depths is currently under way as part of the 1989 grant. The \$300,000 cleanup cost is based on a soil contamination depth of 2 feet, a cost of \$100 per cubic yard for soil cleanup using the bioremediation technique, bid processing costs, and contractor oversight. All administrative costs, such as salary and travel for the project coordinators, would be donated as an in-kind match. In addition, any equipment that the counties can contribute would be donated as an in-kind match.

Presently it is unknown whether any 1989 funds will be available for cleanup, but it is most likely that 1989 funds will be available for cleanup of the most severely contaminated site at Joliet.

The \$300,000 funding level is based on the assumption that the bioremediation technique will be feasible. The other alternatives are more expensive. Therefore, if one of the other alternatives must be used, the requested funding won't be sufficient. In that case, only the most severely contaminated sites would be cleaned up.

ENVIRONMENTAL EVALUATION:

Cleanup alternatives would involve short-term disruption, excavation, and possibly some removal of soils at the site. In the long term, this disruption would be beneficial, as contaminated soils would be cleaned up or replaced with uncontaminated soils. Cleanup of soils would reduce or prevent the potential of groundwater and surface water contamination caused by runoff from the soils. Removal of pesticides at these sites is important to reduce the hazard of exposure to contaminated soil and dust particles and the potential for dangerous emission of toxic air pollutants in the event of a fire.

All impacts related to cleanup would be closely monitored, and applicable rules and regulations would be followed. If the white rot fungi alternative is chosen, research has shown there are no known negative effects from treating contaminated soil with the fungi. The fungi breaks down contaminated compounds into safe, naturally occurring compounds without producing toxic byproducts.

PUBLIC BENEFITS ASSESSMENT:

The public, mainly the affected local communities, would receive long-term benefits from containment or removal of contaminated soils. The types of pesticides and herbicides found, and the high concentration observed, indicate an imminent and substantial health threat. Individuals may be exposed to contamination at the sites by ingestion or skin absorption of contaminated soils, inhalation of contaminated dust, and possibly ingestion or absorption of contaminated groundwater. The cleanup would reduce or eliminate the health risks associated with each site. Further spread of contamination to groundwater or surface water would be prevented.

RECOMMENDATIONS:

A grant of up to \$300,000 is recommended to maintain continuity with the present cleanup investigation. This funding is contingent upon the following conditions:

1. DNRC must approve the project scope of work and budget.
2. In the event DHES recovers cleanup costs from a responsible party at some point in the future, these funds shall be used to reimburse the RDGP special revenue account.

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APPLICANT NAME: Department of State Lands (DSL)

PROJECT/ACTIVITY NAME: Well Assessment and Abandonment

AMOUNT REQUESTED: \$ 300,000

OTHER FUNDING SOURCES AND AMOUNTS:

Applicant \$ 7,027

TOTAL PROJECT COST: \$ 307,027

PROJECT DESCRIPTION:

The Department of State Lands (DSL) is proposing to evaluate the condition of 26 oil wellbores in state-owned Section 36, T35N, R2W, and properly abandon those wells found to be in unsatisfactory condition or no longer producible. The site is located one mile west of the town of Oilmont, Montana.

Each well would be entered and assessed on an individual basis. The wells would first be cleaned and tested for casing integrity. If the pressure test proves unsatisfactory (i.e., loss of pressure >10 percent), the well would be plugged from its

total depth to the surface. Wells that do not evidence pressure loss would be secured with appropriate closing valves. When well work is completed, the failed well locations would be graded to the surrounding terrain and seeded.

Should funds remain from this grant, a survey of state-owned lands in the same area would be conducted by DSL personnel with the aid of contract help or summer students (college level). The sites would be physically surveyed to assess the status of shut-in or temporarily abandoned wells. This information would be utilized to formulate additional grant requests if more work is indicated by the result of the survey.

The well work is anticipated to be completed in one field season. If there are remaining funds, the survey would take place over the course of a second season.

TECHNICAL ASSESSMENT:

There is little doubt that Section 36 wellbores create a negative impact on soil, air, water, and vegetative resources. Currently, open wellheads pose hazards to wildlife and human activity by releasing natural gas and hydrogen sulfide gas, and by the existence of open holes 1,000 feet deep. The soils around the wellheads are oil-saturated, and the ground is covered with oil-field production equipment, reducing the agricultural productivity of the land. Local groundwater, though a very limited resource, is probably being polluted by water and gas flow through corroded casing. These problems would be corrected by this grant project.

A complicating factor, however, is whether RDGP funds should be allocated for this cleanup effort. RDGP statutory provisions state that "*a proposed project is not eligible for funding if there is a liable party who would be relieved of financial or legal responsibility and who can reasonably be expected to be held responsible.*" The mineral lessee, apparently liable for the cleanup and plugging operations proposed here, has declared Chapter 7 bankruptcy. It would appear premature to proceed with the funding of this project until the full outcome of the bankruptcy proceedings is known.

FINANCIAL ASSESSMENT:

The budget is well documented and reasonable for the work described. The bulk of the costs are contracted services as shown below:

Engineer	\$ 31,850
Plugging contractor	204,740
Supplies and materials (cement)	54,000
Seed	650
Contingency	<u>8,760</u>
 TOTAL	\$ 300,000

DSL is contributing \$7,027 for project coordination and oversight.

ENVIRONMENTAL EVALUATION:

Major adverse impacts to the environment are not expected if proper care is taken in the containment and disposal of drilling and plugging fluids or other wastes, if safe abandonment practices are observed, and if the sites are properly reclaimed. Short-term impacts can be expected, primarily dust pollution, emissions from rig engines, noise, vegetation disturbance, and soil compaction. These impacts could be mitigated by prompt and proper reclamation and abandonment procedures.

This project would have a positive impact on soil, air and surface water quality, vegetation, and wildlife. Additionally, petroleum resources and groundwater would be protected by this plugging program.

PUBLIC BENEFITS ASSESSMENT:

In addition to soil and water improvement, successful completion of this project would potentially improve agricultural and oil production on state-owned lands. This would be of significant benefit to the school trust fund.

RECOMMENDATIONS:

A grant of up to \$300,000 is recommended for this project contingent upon the following.

1. DNRC must approve the project scope of work and budget.
2. DSL must furnish a legal opinion, based on the final bankruptcy court action, that there is no responsible party.

APPLICANT NAME: Department of Natural Resources and Conservation (DNRC), Water Management Bureau

PROJECT/ACTIVITY NAME: Arsenic in Upper Missouri River Basin Surface Water and Groundwater

AMOUNT REQUESTED: \$ 179,330

OTHER FUNDING SOURCES AND AMOUNTS:

Applicant	\$ 12,200
U.S. Bureau of Reclamation (USBR)	\$ 60,000
U.S. Geological Survey (USGS)	\$ 115,830

TOTAL PROJECT COST: \$ 367,360

PROJECT DESCRIPTION:

Arsenic concentrations in upper Missouri River basin surface water exceed standards for surface water established by the State of Montana and the U.S. Environmental Protection Agency (EPA). Near the source (geothermal springs in the headwaters of the Madison drainage in Yellowstone National Park), surface water and groundwater arsenic concentrations routinely exceed federal drinking water standards by three-fold.

This project has two objectives. First, a reconnaissance level, well-sampling investigation would be conducted to identify any areas outside the Madison drainage where elevated arsenic concentrations occur in groundwater. If problem areas are identified, public health officials would be notified, and further study would attempt to define the severity and source of the problems.

The second objective is to develop a water quality model for the upper Missouri River. The model would be capable of routing monthly dissolved and total arsenic loads from the source in the upper Madison River to a site below Holter Dam. Water quality data collected at seven stations by the U.S. Geological Survey over an 18-month period would be used to expand the database for model calibration and verification. Additional synoptic studies would focus on determining the importance of various geochemical and sedimentary controls (e.g., pH, adsorption-desorption) on arsenic mobility and transport throughout the upper Missouri River basin.

The water quality model developed by the Department of Natural Resources and Conservation (DNRC) and the U.S. Bureau of Reclamation (USBR) would be used to evaluate the effect of water

management alternatives on arsenic concentrations and loads in the upper Missouri River basin. Several scenarios representing alternative water allocations (e.g., varying levels of consumptive depletions and instream flows) would be developed and effects on arsenic in surface water modeled.

TECHNICAL ASSESSMENT:

Reviewer support for this proposal was mixed. In brief, most discussions focused on the need for additional water quality data and the modeling approach proposed.

The proposal assumes that using a conservative water quality model with existing data is inadequate. Secondly, it assumes that a comprehensive modeling approach, including chemical reactive terms that account for the mobility and transport of trace contaminants within and between basic components of the overall system, would be of considerable importance in allocating surface water reservations.

Regarding the first assumption, some researchers contend that existing data are adequate for a conservative model. Assessing the validity of this contention should precede comprehensive water quality modeling and data collection. For example, when comparing total arsenic versus discharge in the upper Missouri River basin, the bulk of data conforms very closely to a simple dilution line. Using these data one could readily do an arsenic-conservative model evaluation. If these results provide reasonable agreement for 90 percent or more of the data, continued investigation is probably not necessary.

Regarding the second assumption, and perhaps more important, arsenic's effects on health are commanding increasing regulatory attention from both EPA and the Department of Health and Environmental Sciences (DHES). A confusing aspect of the arsenic problem involves two apparently contradictory water quality standards. Based on acute and chronic toxicity, federal drinking water standards limit arsenic to 50 micrograms per liter ($\mu\text{g/L}$; microgram = 10^{-6} grams) in treated water supplies. On the other hand, Montana's surface water (instream) standards--based on EPA's one-case-per-million risk level for carcinogens--allow no increase if an instream value exceeds 20 nanograms per liter (10^{-9} grams). Upper Missouri River water between Three Forks and Fort Peck Reservoir now contains arsenic concentrations 500 to 2,500 times greater than the 20-nanogram/l standard; the Madison River's concentrations are 2,500 to 10,000 times greater. Strict interpretation and enforcement of arsenic standards by EPA or DHES could curtail further consumptive uses of water or other activities that would elevate arsenic concentrations in streams. If this eventuates, the modeling proposed here would be unlikely

to affect water allocations. It would appear that, until a health risk assessment is conducted by state and/or federal agencies, funding of this request is premature.

FINANCIAL ASSESSMENT:

As proposed, this project is a cooperative effort involving DNRC, USBR, the U.S. Geological Survey (USGS), and the University of Montana (UM). The total project cost is \$367,360. Anticipated federal matching funds include \$115,830 through the USGS state/federal cooperative program and \$60,000 through USBR's Technical Assistance to States program. DNRC would contribute \$12,200 (in in-kind services), and the project seeks a grant of \$179,330.

USGS personnel would conduct the groundwater inventory (first objective) and collect surface water data (second objective). Two hydrologists, full-time for one year and half-time for one year, would accomplish the work, assisted by field technicians. A portion of the groundwater work might be subcontracted to the Montana Bureau of Mines and Geology. Sediment geochemistry (second objective) would be accomplished by a graduate student at the University of Montana. For the water quality modeling, DNRC would provide a hydrologist half-time for one year, and USBR would provide a hydrologist full-time for one year.

If initial investigation and study support expanded data collection and comprehensive modeling, then costs appear reasonable for the level of work proposed.

ENVIRONMENTAL EVALUATION:

This study would not have an adverse impact on the environment.

PUBLIC BENEFITS ASSESSMENT:

Water quality data collected and the model developed by the project would increase understanding of the arsenic cycle and improve land and water managers' ability to plan future development that ensures maintenance of surface water and groundwater quality. All water users in the upper Missouri River basin, and especially those who rely on the mainstem for domestic supplies and recreation, would benefit from knowledge of arsenic concentrations in local water supplies.

The information could also be used by the Board of Natural Resources and Conservation to make informed decisions on how to allocate water for existing and future use through the water reservation process currently in progress.

RECOMMENDATIONS:

A grant of up to \$179,330 is recommended for this project contingent upon DNRC approval of the project scope of work and budget. Funding is further contingent on completion of an EPA/DHES health risk assessment for the upper Missouri River to identify what level of arsenic, if any, constitutes an unacceptable public health and/or environmental risk. The project sponsor must then show how this investigation will help identify appropriate management actions to be taken to minimize these risks.

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APPLICANT NAME: Department of State Lands (DSL)

PROJECT/ACTIVITY NAME: Comet Mine Wetlands Development

AMOUNT REQUESTED: \$ 250,700

OTHER FUNDING SOURCES AND AMOUNTS:

Applicant \$ 4,744

TOTAL PROJECT COST: \$ 255,444

PROJECT DESCRIPTION:

The Montana Department of State Lands (DSL) proposes a metal mine reclamation project at the Comet Mine in the High Ore Creek drainage north of Basin, Montana, which would complete reclamation work performed during the 1990 construction season. The project objectives are to: (1) enhance the quality of drainage water flowing from the Comet Mine tailings area, (2) reduce the concentration of heavy metals entering High Ore Creek and the Boulder River, (3) determine the effectiveness of the system through an active monitoring program, and (4) evaluate the applicability of the system for similar mining sites.

The general nature of the project would be to construct wetlands downstream of the tailings to provide a system for biologically and chemically removing heavy metals from the tailings drainage water. The wetlands system would have several individual cells that receive a controlled flow of water based on the area of wetlands available. Associated with the wetlands, the project would also include the construction of a sheet-pile cutoff wall to restrict the flow of groundwater beyond the tailings area and the construction of a drainage interceptor ditch to reduce surface water runoff flows into the wetlands.

This project would be an extension of reclamation work at the Comet Mine performed in 1990. The 1990 reclamation project, titled the High Ore Creek Reclamation Project, is funded, in part, by a 1987 Resource Indemnity Trust (RIT) grant awarded to the Montana Department of Fish, Wildlife and Parks (DFWP). Construction of a wetlands treatment system was approved as part of the 1987 RIT grant; however, budget limitations prevented its inclusion in the 1990 construction work. The main components of the reclamation work completed in 1990 include: (1) rehabilitation of the High Ore Creek diversion around the Comet Mine tailings by constructing a channel lined with an impermeable membrane liner, (2) construction of a sediment dam and subsurface drainage system at the toe of the tailings, and (3) construction of a sheet-pile cutoff wall upstream of the tailings to reduce groundwater flow into the tailings area. The objectives of the 1990 work are to reduce the amount of drainage water entering the tailings area and to reduce the amount of sediment and suspended particles in the drainage water leaving the tailings.

Much of the design for the wetlands was completed during the design for the 1990 reclamation work. Any updated technology would be incorporated into the proposed wetlands design, if needed.

The currently proposed construction would be downstream of the new sediment dam and would receive water from the subsurface drainage system. The sediment dam (1990 construction) will function to remove the majority of suspended particles from the drainage water. The purpose of the wetlands would be to reduce heavy metal concentrations in the drainage water. The sheet-pile cutoff wall would help reduce the flow of groundwater beyond the tailings area, possibly bringing the water to the surface for further treatment at the sediment dam and wetlands. The proposed ditch at the south side of the wetlands would help to reduce the volume of surface runoff entering the wetlands area.

The project would include a monitoring program to evaluate the effectiveness of the wetlands. Sampling of the water entering and leaving the wetlands would be undertaken. Monitoring of High Ore Creek upstream and downstream of the Comet Mine would be included also.

TECHNICAL ASSESSMENT:

The original scope of work in the 1987 DFWP grant included rehabilitation of the diversion channel, construction of sediment dams, installation of an upstream cutoff wall, construction/repair of a south drainage ditch, and construction of a wetlands treatment system. A professional service contract was entered into between DFWP and a consultant to prepare final engineering plans and technical specifications. The reclamation plan design has been completed and has been reviewed by DFWP, the Montana

Department of Highways (DOH), and the Montana Department of Natural Resources and Conservation (DNRC). Contract documents for construction were developed and construction commenced in June 1990.

Because of budget limitations, not all of the originally planned reclamation measures were accomplished in the 1990 project. The main items of work to be completed with available funds will be rehabilitation of the diversion channel and construction of a lower sediment dam, subsurface drainage system, and portions of an upstream cutoff wall.

The basic problem that exists at the Comet Mine calls for some sort of water treatment system to remove the high concentrations of heavy metals. The mine is located at a high elevation (approximately 6,400 feet, mean sea level) with adverse climatic conditions and lack of year-round accessibility. Therefore, the requirements for construction and continual maintenance of traditional water treatment systems preclude their use in this environment. The wetland system represents an approach that is inexpensive, requires little or no maintenance, and depends on natural processes for metal ion removal.

Several studies have been done that support the project. Based in part on these studies, and to prevent further degradation of the water and associated aquatic life, it is important that measures to reduce the concentration of heavy metals be implemented as soon as possible. The wetlands system would provide chemical and biological treatment of the drainage water, a logical second phase of treatment following the measures implemented during the 1990 construction.

If no action is taken, degradation of the streams will continue, resulting in further reductions in aquatic life.

FINANCIAL ASSESSMENT:

The Comet Mine Wetlands Development project is estimated to cost \$255,444. Of the total amount, \$4,744 will be contributed by the Montana Department of State Lands through in-kind grant administration. The remaining \$250,700 is requested from the Reclamation and Development Grants Program.

The budget breakdown is divided into four separate phases that coincide with the project schedule.

Task 1 - Grant Implementation Phase (\$4,744). This phase would be completed by DSL. Project administrative procedures, the DNRC grant agreement, and consultant(s) selection would be the priorities for this item.

Task 2 - Preconstruction Phase (\$25,700). This task would be performed by the consultant(s). The work involved would require the preparation of final drawings, specifications, bid packages, and permit applications. Bid solicitation and contract documents would be prepared for construction work.

Task 3 - Construction Phase (\$209,850). This item would involve the efforts of both the consultant and the construction contractor. The contractor would be responsible for building the design system, and the consultant would be responsible for the administration of the construction contract and for the construction inspection.

Task 4 - Postconstruction Phase (\$15,150). This phase would require the consultant to prepare the construction final report and assist the DSL project manager with DNRC grant closeout. System monitoring and maintenance schedules would also be developed and implemented.

Cost estimates provided appear reasonable for the work proposed.

ENVIRONMENTAL EVALUATION:

During construction, short-term adverse impacts, primarily sedimentation, would affect surface water quality. This impact would be mitigated by compliance with required permits. Noise and dust are other predictable short-term impacts, which in this instance should be of relatively minor consequence. Long-term adverse impacts are not anticipated. Net improvement in groundwater and surface water quality and aquatic habitat is predicted over the long term.

The project is designed to implement a long-term solution for remediation of the environmental damage created by previous mining activities. The objective is to prevent contaminants from the Comet Mine drainage from entering High Ore Creek. Achieving this goal would prevent the deterioration of downstream resources and property. The success of the project, or benefits derived, would be measured by active long-term water monitoring. Sampling of the water would give accurate records of the changes in quality that could be directly attributable to this project.

PUBLIC BENEFITS ASSESSMENT:

The project results would be used to further the technological knowledge of wetlands and their operation and capabilities. Comet Mine is typical of mountainous hard rock facilities, and this system may be used in similar situations. The results of the project may be utilized by state and federal agencies responsible for administering the reclamation of mining sites, universities, research organizations involved in the

advancement of wetland technology, and private or industrial enterprises that are actively pursuing the markets of mine reclamation and remediation.

Economic benefits could be realized through creation of an improved environment that would attract recreationists and provide additional tourist trade for the communities of Basin and Boulder.

RECOMMENDATIONS:

A grant of up to \$250,700 is recommended for this project contingent upon DNRC approval of the project scope of work and budget. Also, the implementation of this project must be consistent with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the Comprehensive Environmental Cleanup and Responsibility Act (CECRA).

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APPLICANT NAME: Glacier County Conservation District

PROJECT/ACTIVITY NAME: Comprehensive Evaluation of Groundwater Contamination, Red River Drainage, Glacier and Toole Counties, Montana

AMOUNT REQUESTED: \$ 197,453

OTHER FUNDING SOURCES AND AMOUNTS:

Applicant	\$ 16,407
Montana Bureau of Mines and Geology	\$ 70,228

TOTAL PROJECT COST: \$ 284,088

PROJECT DESCRIPTION:

Glacier and Toole Counties in northwestern Montana contain thousands of oil and gas wells and together are a leading production area for oil and gas in Montana. The area is also a major producer of dryland wheat and barley.

Glacier County Conservation District is proposing to examine the extent of groundwater contamination due to oil-field and agricultural activities in the 55,000 acres surrounding the Red River Valley drainage. The goal of this study is to develop and increase awareness of land and water resource vulnerability.

Local understanding of these environmental problems can be a strong and lasting incentive to prevent pollution. The site evaluations and information dissemination proposed in this project are intended to develop this incentive.

Water wells, oil wells, and injection wells would be inventoried and mapped. A hydrogeological investigation would be performed at selected sites. Groundwater occurrence, flow, and pollution vulnerability would be assessed, with particular emphasis on those aquifers used for drinking water. Where water supplies are judged to be vulnerable, water samples would be collected and analyzed. A final report on accomplishments and conclusions would be prepared. All activities and reporting would be carefully coordinated to augment or assist existing programs by the Montana Salinity Control Association and the Montana Departments of Health and Environmental Sciences, Agriculture, Natural Resources and Conservation, and State Lands.

TECHNICAL ASSESSMENT:

Glacier County Conservation District has become increasingly concerned about potential groundwater contamination. Last fall (October 1989), it sponsored a two-day meeting and field tour. All interested and concerned citizens, organizations, legislators, and federal and state agencies were invited to Cut Bank to observe, discuss, and initiate a correction plan. Approximately 75 people attended the event. Most participants in the fall 1989 field tour recommended that the district undertake a comprehensive evaluation of all sources of groundwater contamination, starting with the 55,000-acre Red River drainage, where many of the worst problems have been observed.

There have been reports of leaking brine pits, breaches of pit safety berms, and bursting of crude oil production mains located in outwash gravels that serve as sources of drinking water. The report, "Assessment of USDW Endangerment Potential in the Graben Coulee Field of Glacier County, Montana," prepared for the U.S. Environmental Protection Agency, documents vertical migration of Cut Bank formation water (with high total dissolved solids and chlorides) to the surface from around the production casings of two oil wells due to faulty seals between production piping and casing. The surrounding area was contaminated with hydrocarbons leaking from the production apparatus. Other problems may also exist.

A large number of saline seep areas, due to agricultural practices, have also been noted. Since current oil-field and agricultural activities pose a threat to groundwater quality, an assessment of the extent of contamination is necessary.

The cost of treatment of degraded groundwater far exceeds the cost of prevention. If future contamination can be prevented by a thorough understanding of the practices that cause groundwater contamination, thousands of dollars of public and private funds may be saved in treatment and monitoring costs.

FINANCIAL ASSESSMENT:

The principal investigator, an environmental engineer/hydrogeologist from the Montana Bureau of Mines and Geology, would conduct all aspects of the project, devoting 3/4 time. The principal investigator would be assisted by a graduate student, who would help with the overall evaluation and concentrate on the hydrogeological and petroleum aspects. The Montana Salinity Control Association would also assist, emphasizing the agricultural aspects.

Glacier County Conservation District is committed to becoming informed and eventually solving its own problems with community-wide involvement. All members of the district have volunteered and want to participate in the project. They would assist project personnel in getting permission to gather information; visiting with all landowners and oil-field operators; collecting samples; monitoring wells; helping select sites for detailed evaluation; drilling and monitoring sites; and coordinating meetings, workshops, and field tours to disseminate information and project findings. Non-RDGP contributions would account for \$86,635 of the total cost. Given the inventory nature of the project, the cost seems reasonable for the amount of work to be performed.

ENVIRONMENTAL EVALUATION:

The ultimate goal of this project is to prevent surface water and groundwater contamination. There is not likely to be any major adverse impact on the environment as a result of this well inventory and sampling proposal. However, monitoring wells could pose some impacts on water quality if not abandoned properly. Adherence to related regulations should mitigate any potential problem.

PUBLIC BENEFITS ASSESSMENT:

An obvious benefit would be the identification of possible public health threats due to inorganic, organic, or microbial contamination.

The project would also provide a basis for informed discussion between key groups regarding abatement measures, needed policy changes, or increased state agency efforts. A successful project would be an asset in the competition for funds for future water quality investigations. Pollution prevention

would prevent high treatment and monitoring costs. The public would be better informed so that they may influence decision makers and recognize that they themselves may be polluters.

The results of this study would provide an information base that would identify priority areas for water quality management. Information would help direct local efforts toward pollution prevention and remediation. State agencies might use the information to focus efforts. The project would assist the Montana Salinity Control Association and provide support data for the State Pesticide Survey. Data would be available to consultants and governmental agencies faced with cleanup operations.

RECOMMENDATIONS:

A grant of up to \$197,453 is recommended for this project contingent upon DNRC approval of the project scope of work and budget.

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APPLICANT NAME: Montana Department of Health and Environmental Sciences (DHES), Water Quality Bureau

PROJECT/ACTIVITY NAME: Hydrogeology, Land Use, and Chemical Quality of Water Resources in the Clarks Fork Yellowstone River Basin, Montana

AMOUNT REQUESTED: \$ 218,250

OTHER FUNDING SOURCES AND AMOUNTS:

U.S. Geological Survey (USGS)	\$ 218,250
Applicant and the Montana	\$ 35,000
Department of Agriculture (DOA)	

TOTAL PROJECT COST: \$ 471,500

PROJECT DESCRIPTION:

Shallow groundwater in the Clarks Forks Yellowstone River basin is used by most residents for drinking. All but 4 of the 24 regulated public water supply systems and nearly all of the domestic and stockwater supplies in Carbon County rely on shallow groundwater. In 1986, trace levels of aldicarb were detected in 6 of 17 wells sampled in the basin. Concentrations of the pesticide in groundwater did not exceed health advisory levels,

but the presence of agricultural chemicals in the groundwater indicated that the shallow aquifer is vulnerable to contamination.

State agencies are developing groundwater pollution prevention programs--specifically, pesticide management plans and wellhead protection programs--to eliminate or reduce the chances of contaminants entering vulnerable groundwater resources. Baseline hydrogeologic assessment information is necessary before prevention programs can be efficiently implemented.

The project area involves the Clarks Fork Yellowstone River basin, including Rock Creek, the major tributary to the Clarks Fork Yellowstone. Specifically, the project consists of the tasks listed below.

1. Compile existing data, acquire available Geographic Information System (GIS) coverage, and prepare base maps
2. Conduct field inventory of wells, land use, and water use
3. Digitize additional needed coverage for use in the GIS
4. Plan, install, and monitor 40 observation wells
5. Conduct tests to determine hydraulic characteristics of the alluvial aquifer
6. Measure streamflow gains and losses to determine relationships between groundwater and surface water
7. Sample wells and streams for water quality
8. Analyze data and prepare report
9. Conduct public information meetings

This study is designed to develop an understanding of the hydrogeologic flow systems in the Clarks Fork Yellowstone River basin, identify the extent of existing or potential groundwater contamination problems, identify vulnerable groundwater sources, and provide information necessary for resource managers and the public to make sound decisions regarding protection of water resources. Results of the study would be utilized by the public and agencies to design and implement optimum groundwater pollution prevention programs.

TECHNICAL ASSESSMENT:

The Clarks Fork Yellowstone River is thought to provide a "worst case scenario" in terms of potential for groundwater contamination from agricultural chemicals. The project would provide detailed hydrogeologic and land use practices information needed to evaluate this potential.

Some reviewers questioned whether 40 observation wells would be enough to accomplish potentiometric mapping of both the Clarks Fork Yellowstone River and Rock Creek, as proposed. The six

aquifer tests proposed would give a fairly spotty picture of aquifer characteristics, especially if distributed over both Rock Creek and the Clarks Fork Yellowstone drainages. The variation might be large, and more tests might be needed.

FINANCIAL ASSESSMENT:

The budget estimates appear to be reasonable for the proposed work. The first year of the project would be funded by DHES, DOA, and USGS. Total funding for the first year is expected to be \$70,000 for field inventory of wells, land use, and water use and planning activities. The second and third years of the project would be funded by this grant and USGS. The budget breakdown is shown below.

Salaries and wages	\$ 96,000
Benefits	19,300
Contracts	53,000
Supplies and materials	5,000
Communications	2,000
Travel	15,000
Rent and utilities	23,950
Equipment	2,000
Miscellaneous	<u>2,000</u>
TOTAL	\$ 218,250

Expenditures for salaries and wages include project management and supervision, project chief, part-time project technicians, clerical and administrative support, and technical assistance. Expenditures for contracts include drilling, USGS and DOA laboratory services, and printing costs. Expenditures for supplies include office supplies, laboratory and sampling supplies, and observation well completion materials. Expenditures for communications include telephone, mail, and computer network line charges. Expenditures for travel include vehicle rental and mileage and per diem costs for field work and project meetings. Expenditures for equipment include recorder rental, field inventory and sampling equipment, and computer support equipment.

ENVIRONMENTAL EVALUATION:

No adverse environmental impacts should result from this project. Non-implementation could result in groundwater contamination not being detected in the Clarks Fork Yellowstone River basin because hydrogeologic, land use, and chemical water quality information was not available.

PUBLIC BENEFITS ASSESSMENT:

There is a great deal of public interest and concern regarding pesticide contamination. Benefits provided to the public would include a determination of the safety of the area's drinking water supply. The results of the project could be used as the basis for groundwater pollution prevention programs in this area, reducing the chances of future groundwater contamination. This study should also serve as a model for assessment of other areas where groundwater is vulnerable to contamination from pesticides.

RECOMMENDATIONS:

A grant of up to \$218,250 is recommended for this project contingent on the following.

1. DNRC must approve the project scope of work and budget.
2. The geographic scope of the project must be limited to include only the Clarks Fork Yellowstone River aquifers. The study should not include Rock Creek unless specifically approved by DNRC.
3. The applicant must develop a pesticide management plan/wellhead protection plan and public education-information program aimed at the agricultural community.

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APPLICANT NAME: Fort Peck Assiniboine and Sioux Tribes

PROJECT/ACTIVITY NAME: Extent, Magnitude, and Movement of Contamination in Unconsolidated Quaternary Aquifers in and near East Poplar Oil Field, Northeastern Montana

AMOUNT REQUESTED: \$ 290,400

OTHER FUNDING SOURCES AND AMOUNTS:

Applicant	\$ 17,960
U.S. Geological Survey (USGS)	\$ 290,400

TOTAL PROJECT COST: \$ 598,760

PROJECT DESCRIPTION:

Contamination of drinking water wells was first reported to the Fort Peck Tribes' Office of Environmental Protection in November of 1988. Testing of samples from these domestic water wells during the investigation resulted in higher sodium and

chloride concentrations than the levels that were first recorded in 1985. From the comparisons of the water tests, it was evident that brine from oil-field development in the vicinity was contaminating these domestic wells. However, the type of oil-field activity that is affecting these wells cannot be determined without further investigation of the problem.

The general objectives of the proposal are to determine areas of contamination both vertically and laterally, to determine the chemical characteristics of the brine and the contamination, to determine the geochemical reactions that may occur, to determine the direction and velocity of movement of the contamination, to determine sources of the contamination, and to determine the effect of the contamination on other water resources in the unconsolidated Quaternary aquifers in and near the East Poplar oil field and also on the Poplar River.

The proposed project area includes approximately 70 square miles located 1 mile north of Poplar, Montana, on the Fort Peck Indian Reservation. Project activities would include field inventory of existing wells and potential brine sources; determination of the structure or topography of the top of the uppermost relatively impermeable layer; installation of about 20 observation wells, most of which would be completed in unconsolidated aquifers; chemical sampling and analysis of water from about 40 wells, various brine sources, and the Poplar River; and determination of the direction and rate of flow of the contamination by constructing flow nets.

TECHNICAL ASSESSMENT:

The purpose of the proposed project is to determine the extent, magnitude, and movement of brine contamination in the unconsolidated Quaternary aquifers in and near the East Poplar oil field. Specific objectives are:

1. Determine areas of contamination and the vertical and lateral extent of contamination in those areas
2. Determine the chemical characteristics of the brine and the contamination, including data on selected isotopes and selected trace halides
3. Determine possible geochemical reactions that may occur between the brine, uncontaminated groundwater, and aquifer materials
4. Determine the direction and, if possible, the rate of movement of conservative constituents
5. Determine the sources or source areas of the contamination
6. Determine the effect of the contamination on other water resources, such as the Poplar River

The results of an earlier U.S. Geological Survey (USGS) study indicate that brine from oil-field production is the probable source of sodium chloride contamination in the alluvial aquifer. Additional data collection is necessary to determine the areal extent of the contamination, rates of movement of brine in the alluvium, geochemical reactions that may occur between the brine and alluvium and result in precipitates, and changes in water quality with depth in the alluvium.

Answers to some of these unknowns may be found by using resistivity and electromagnetic geophysical techniques to isolate probable sources of the contamination plumes. To supplement these data, the location of all producing and disposal wells, dry holes, tank batteries, pipelines, and storage or evaporation pits needs to be determined. The quantity of brine and period of time that brine was injected into each disposal well also need to be determined.

An analysis of these data could isolate the point sources of contamination throughout the oil field. A detailed drilling and sampling program could then be undertaken to determine the magnitude of contamination and its lateral and vertical distribution from these point sources.

If sufficient data are obtained, contaminant transport models might be used to simulate the system. Depending on the degree of simulation that is achieved, the model could be useful in predicting the movement and residual effects of the contaminant through the alluvium down gradient from the oil field.

Final results of the project could be used by other resource managers who have oil and gas activity in their resource areas. "Fingerprinting" of brine water allows resource people to quickly identify the type of water contaminating the groundwater aquifer. The use of a surface conductivity meter for a large area allows the delineation of a plume without drilling expensive groundwater monitoring wells. Once the sources contributing to the contamination have been identified, steps could then be taken to mitigate the effects of the contamination. These steps could include various plugging efforts, as well as development of rules and regulations governing disposal lines and mud pits in heavily developed areas.

However, the question of what management response would be generated by the proposed data collection, whatever its results, is an open one. It appears unlikely that any agency or group would implement a serious reclamation program as a result of the study without additional grant funding from RDGP or some other source.

FINANCIAL ASSESSMENT:

Salaries and wages	\$ 180,090
Supplies and materials	28,018
Rent and utilities	28,018
Contracted services	35,400
Communications	9,889
Travel	7,485
Miscellaneous	<u>1,500</u>
TOTAL	\$ 290,400

Costs are not well documented. Breakout of costs (\$290,400) contributed by USGS is not described in sufficient detail. The total project cost of \$598,760 appears high for the type and extent of investigation being proposed.

The project may receive funding from the Bureau of Indian Affairs and/or the U.S. Environmental Protection Agency (Section 106 grant).

ENVIRONMENTAL EVALUATION:

This project would have minimal impacts on the study environment. Drilling of groundwater monitoring wells would result in some minor surface damage. Proper abandonment of monitoring wells should mitigate any impact.

Minor archeological sites, mostly tepee rings of the Plains Indian tribes, have been discovered in the area. Agricultural practices in the area have heavily damaged much of the original land profile. No impacts to the archeology should result from this project as special care would be used if and when archaeological sites are located. The Fort Peck Tribes retain a person who inspects sites for archaeological and cultural significance and who would be retained for inspection services.

PUBLIC BENEFITS ASSESSMENT:

The most important public benefit from this investigation would be further identification of the source or sources of contamination. Once the source(s) are identified, appropriate agencies could then determine which actions could alleviate or moderate the contamination. If the project findings ultimately result in cleanup of contaminated surface water and groundwater, all Montanans would benefit from increased protection of their natural resources.

RECOMMENDATIONS:

A grant of up to \$290,400 is recommended for this project contingent upon DNRC approval of the project scope of work and

budget and submittal and approval of USGS budget detail and work plan. Please refer, however, to the comments regarding the need for transition from investigation to cleanup (found in the Technical Assessment).

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APPLICANT NAME: Sheridan County Conservation District

PROJECT/ACTIVITY NAME: Extent of Oil-Field Waste Contamination in Lakes and Aquifers in Eastern Sheridan County

AMOUNT REQUESTED: \$ 134,736

OTHER FUNDING SOURCES AND AMOUNTS:

Montana Bureau of Mines and Geology (MBMG)	\$ 15,010
Soil Conservation Service (SCS)	\$ 2,000
Sheridan County	\$ 5,000
Applicant	\$ 5,700

TOTAL PROJECT COST: \$ 162,446

PROJECT DESCRIPTION:

Oil development and production in the Goose Lake field has resulted in extensive groundwater contamination near Goose Lake in eastern Sheridan County. The contamination was discovered in areas of Sheridan County with concentrated oil-field activity. The main sources of contamination are several buried reserve pits located in Sections 22, 27, and 28, T36N, R58E.

The primary objective of this project is to define the extent of contamination. The extent of the contamination would be defined by measuring water levels and water quality in vertically separated sand and gravel zones within the outwash deposit. These data would be interpreted to document the degree of hydraulic interconnections between the various sand and gravel zones. Once the extent of contamination is established, recommendations for mitigating the problem would be developed.

The project would be divided into three phases:

1. Definition of surface water and groundwater contamination near Goose Lake
2. Definition of contamination and potential contamination of deeper aquifers near Goose Lake

3. Development of recommendations and options for reclamation and mitigation of the contamination problem

The tasks would be performed over a two-year period. Preliminary work would include acquiring materials needed for field work and a literature search concerning reclamation methods. Electro-magnetic (EM) surveys would be conducted in the spring of 1992. Wells would be installed during the summer and fall of 1992. Water sampling and water level monitoring would begin as soon as the wells are installed. Recommendations and reclamation options would be evaluated on a continuous basis. It is anticipated that, as information is collected, reclamation options would be developed based on the new data. Reports would be periodically submitted, and a final report would be completed by December 1993.

The project described would follow up on the 1986 Sheridan County oil-field brine study by focusing more intensive study on one of the most concentrated areas of reserve pit contamination. The proposed study would investigate the details of contaminant transport, which appears to be complicated in this area by density-driven flow of heavy, saline brines and by interactions between a major groundwater aquifer (underlying a portion of Goose Lake) and Goose Lake.

TECHNICAL ASSESSMENT:

Understanding the transport of these contaminants is important because:

1. Previous work indicates that groundwater quality is impaired to the extent that beneficial uses are adversely affected or precluded.
2. The contaminated aquifer has a poorly understood relationship with the productive gravels of the Westby-Dagmar aquifer, for which a water reservation application is pending.
3. Surface water quality is apparently being affected by contaminated groundwater.
4. Density-driven groundwater flow identified in the previous study needs to be better understood to predict contaminant behavior at other brine sites in the region.
5. There is substantial interest in developing additional irrigation water from the Westby-Dagmar aquifer, both through the reservation and through individual permits. The water quality implications of pumping high yield wells in the vicinity of shallow brine-pit contamination of aquifers need to be better understood.

The study plan is somewhat nonspecific with regard to well locations and sampling points. This is necessitated by the study design, which incorporates preliminary geophysical surveying as a tool for locating well installations. This is a reasonable approach, but requires the budget to be generalized. The study plan and budget do appear to be adequate to define groundwater flow and hydrochemistry to a useful level. The final drilling and sampling plan should emphasize vertical gradients and groundwater-surface water relationships near lake boundaries.

Provision should be made for long-term maintenance or eventual reclamation of the project's monitoring wells. Generally, the project is justified and feasible from a technical standpoint. Detailed information of the type proposed would generally be needed to support contaminant management and remediation actions in complex aquifers with linked surface water bodies.

However, the question of what management response would be generated by the proposed data collection, whatever its results, is an open one. It appears unlikely that any agency or group would implement a serious reclamation program as a result of the study recommendations without additional grant funding from RDGP or some other source. The Water Quality Bureau of the Department of Health and Environmental Sciences is unlikely to have discretionary funding available for these types of sites. Oil-field wellhead sites are specifically excluded from the State Superfund Program, and there is no equivalent to the Abandoned Mine Lands Reclamation Program. The Board of Oil and Gas Conservation is charged with regulation of oil and gas activities and recently has initiated a systematic inventory, study, and cleanup of problem abandoned oil and gas operations that may be the logical funding source for this project.

It is the general impression of the reviewers that continued investigation of oil and gas impacts without commitment and funding for cleanup operations is not cost-effective. Absent this commitment, the conservation district should continue its efforts in working with appropriate regulatory agencies and industry to prevent future contamination and begin a systematic cleanup of abandoned operations.

FINANCIAL ASSESSMENT:

The total project budget is estimated at \$162,446 for the two-year duration of the project, including \$134,736 in requested RDGP grant funds and \$27,710 in matching funds and in-kind services. Sources of matching funds include the Sheridan County Conservation District, Sheridan County, Montana Bureau of Mines and Geology, and Soil Conservation Service.

Personnel costs are based on projected 1990 salary levels, with 33 percent added for benefits. A graduate stipend for research support is budgeted at \$4,000 per year.

Travel costs are estimated at \$0.25/mile for administrative travel and \$0.36/mile for travel requiring field vehicles. Per diem is estimated at \$40.00/day.

Office expenses would be charged at cost. The Sheridan County Conservation District office would be used as a base of operations for the project, and 25 percent of its rental expenses would be committed to the project as in-kind services.

Drilling costs would be on a per-day basis, not including travel and mobilization. Two mobilizations would be required, one in each year of the project. The drill would be a Mobile B-50 auger rig, capable of drilling, sampling, and well installation to a maximum depth of 100 feet. For deeper wells, a mud rotary drill would be contracted from the Sheridan County area. The auger drill is considered to be faster and more economical than a rotary in conditions for which it is suited, such as are anticipated for this project.

Test well materials include 6,000 feet of 2-inch casing at \$0.38 per foot, 50 pails of bentonite tablets at \$35.00/pail, and 8 yards of fine gravel pack at \$50.00/yard. All prices are quoted assuming delivery to the Plentywood area. Miscellaneous expenses (e.g., well shelters) are estimated at \$600.

Nonexpendable water testing equipment includes a conductivity meter, a pH meter, and two complete water sampling and filtration outfits (messenger bailer, in-line filter outfit). Expendable supplies include filters and Quantabs.

Equipment rental is estimated as follows:

EM-31	2 months at \$1,000/month
EM-34	2 months at \$1,500/month
Geodimeter level	2 months at \$600/month

Costs, particularly project administration costs (\$13,400), are estimated on the high side. Because the focus of this project is primarily research (conducted by MBMG), these costs should be reevaluated and apportioned accordingly.

ENVIRONMENTAL EVALUATION:

Major adverse impacts are not anticipated from this research project. Short-term impacts would be minimal and primarily involve vehicular transport to and from sites. Monitoring wells need to be properly abandoned upon completion of the study.

PUBLIC BENEFITS ASSESSMENT:

If the project findings result in cleanup of contaminated surface water and groundwater, the benefits would be substantial. If, however, the study results are not acted upon, it would become another scientifically interesting research project. It might be prudent to wait and see what becomes of recommendations for oil-field cleanups made in several other previous studies.

RECOMMENDATIONS:

A grant of up to \$134,736 is recommended for this project contingent upon DNRC approval of the project scope of work and budget. Please refer, however, to the department's comments regarding the need for transition from investigation to cleanup (found in the Technical Assessment).

CHAPTER IV

SUMMARIES OF PROJECTS NOT RECOMMENDED FOR FUNDING

Following are summaries of proposals that are not recommended for RDGP funding.

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<u>APPLICANT NAME:</u>	Butte-Silver Bow Government
<u>PROJECT/ACTIVITY NAME:</u>	Upper Clark Fork River Basin Coordinator
<u>AMOUNT REQUESTED:</u>	\$ 171,806
<u>OTHER FUNDING SOURCES AND AMOUNTS:</u>	
Applicant	\$ 737
<u>TOTAL PROJECT COST:</u>	\$ 172,543

PROJECT DESCRIPTION:

The 1989 legislature (HB 329) approved hiring an issues and technical information coordinator for the upper Clark Fork River basin who would:

(1) provide policy, procedural, and technical information, as appropriate, to local government officials and citizens of the upper Clark Fork River basin to enable them to effectively participate in decisions concerning the assessment, management, and rehabilitation for the water and aquatic resources of the basin; (2) evaluate technical assessments prepared by state and federal agencies for purposes of determining environmental problems related to contaminated soils and water, potential health risks for citizens of the basin, and preferred options for accomplishing rehabilitation; and (3) participate in meetings and other activities with state and federal agency personnel and other parties concerning the management and rehabilitation of the basin's water and aquatic resources.

An appropriation was further approved to Butte-Silver Bow in the amount of \$100,000 covering a two-year period. The current application proposes to extend the coordinator position for an additional two-year period.

TECHNICAL ASSESSMENT:

Essentially there are two issues surrounding the use of RDGP funds to fund the coordinator position. The first is whether the coordinator provides information and services otherwise not available to the local governments, and the second is whether these services should be funded in the long term by the state or by the local governments affected.

Regarding the first issue, the Butte/Anaconda community is endowed, perhaps more than any other community in Montana, with an impressive assortment of scientists, educators, legislators, government and industry officials, and local citizens who have committed themselves and their expertise to solve local problems. The Citizens Technical Environmental Committee is a case in point and provides a fine example of the spirit and cooperation needed to address the concerns and issues relative to Superfund remedial action. It is not apparent how the proposed position would enhance these efforts beyond what is already available.

Second, the general function of the coordinator--to evaluate, inform, and recommend--is no different from that of many personnel currently employed by the Butte-Silver Bow and Anaconda local governments. If circumstances and need dictate additional employees over the long term, it would seem appropriate to meet these needs using local resources. The uncertainty of RDGP funding from year to year argues against depending on it as a stable, continuous source of funding for this position. Continuity seems a critical component of position effectiveness.

FINANCIAL ASSESSMENT:

The budget breakdown is as follows:

Salaries and wages	\$ 3,471
Employee benefits	895
Contracted services	<u>167,440</u>
TOTAL	\$ 171,806

The proposal for 1992-1994 increases the number of hours per week from 25 to 35, which would increase current level funding from \$100,000 to \$171,806. The contracted services (\$167,440 of the \$171,806 requested) are for the cost of the coordinator. This

figure translates to \$46 per hour, which is not unreasonable for consultant services of the type proposed. Given the uncertainty of position need and urgency, cost-effectiveness is questionable.

ENVIRONMENTAL EVALUATION:

The hiring of this position would not directly impact the environment.

PUBLIC BENEFITS ASSESSMENT:

If funding this position were the only alternative for informed and effective public and local government participation in the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process, the benefits would be considerable. This does not appear to be the case.

RECOMMENDATIONS:

No funding is recommended for this project.

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APPLICANT NAME: Montana College of Mineral Science and Technology/Center of Excellence

PROJECT/ACTIVITY NAME: Pilot Plant Treatment of Contaminated Water from the Berkeley Pit

AMOUNT REQUESTED: \$ 299,879

OTHER FUNDING SOURCES AND AMOUNTS: None

TOTAL PROJECT COST: \$ 299,879

PROJECT DESCRIPTION:

The applicant proposes that a treatment plant will be needed in the near future to treat water from the Berkeley Pit in Butte, Montana. Before a full-sized plant can be designed and built, treatment processes must be evaluated and perfected at the pilot plant scale.

As the result of an ongoing laboratory test program at Montana Tech, a treatment process for Berkeley Pit water has been developed and is proposed for pilot plant testing. The process is fairly simple and relies on existing methods of water treatment. In brief, it utilizes selective neutralization and oxidation to produce, first, a disposal sludge containing sulphate, aluminum, iron, and arsenic, and then two valuable sludges containing zinc and a zinc-manganese mixture. Copper is

recovered in a pretreatment step using cementation with iron. Residual manganese and sulphate are removed using permanganate oxidation and ion exchange. The final product is water that meets applicable discharge standards and so can be used or discharged safely.

Construction and operation of this pilot plant would enable knowledgeable, timely design and construction of a full-sized treatment plant. Commercial scale operation of such a plant would help preserve water quality in the Butte basin and ultimately the entire Clark Fork Valley by preventing contamination of groundwater and surface waters with acidic, metal-laden mine water.

In addition, the pilot plant would develop methods of recovery of valuable metals from Berkeley Pit water, reducing the volume of waste sludge to be disposed of and defraying treatment costs. These by-products could also be a feedstock for value-added products, creating jobs and increasing the tax base.

Results of this pilot plant work would be distributed to interested parties, including the public, as promptly as possible.

TECHNICAL ASSESSMENT:

Research, sponsored by the U.S. Bureau of Mines (USBM) Generic Center Grant #G1175149-3022, is ongoing at Montana Tech on treatment methods for pit water, and this proposal is based on results of that research. To date, the research has developed a chemical model of the pit and devised a treatment method based on neutralization with limestone, aeration, and further neutralization. The process produces a disposal sludge containing the bulk of the iron, sulphate, and arsenic in pit water and separate sludges containing the bulk of the zinc and manganese, which are of economic interest. Copper is recovered in a pretreatment stage using iron cementation. Some preliminary results of this research have been published by the Bureau of Mines and Geology.

Many design parameters cannot be established by laboratory testing. These include actual capacity of plant equipment, quantities of reactant chemicals needed in practice, and dosages of flocculants and other auxiliary chemicals used. Laboratory testing is unable to adequately model process return circuits and chemical buildup caused by them. Finally, problems that are trivial at the bench scale, such as reactor and pipe clogging caused by scale formation, can turn out to be very troublesome in a full-scale plant. Pilot plant testing can identify these difficulties and provide an opportunity to correct or at least develop methods of dealing with them before designing a permanent plant.

A full-size plant would likely require about two years to build with another six months for startup and shakedown. Design would require a full year before construction could even start. This pilot plant should be fully operational about 6 months after it is authorized and funded, and at least 18 months of operation are needed to obtain all the information needed for good design. This adds up to a minimum of five and one-half years between the pilot plant authorization and full-sized plant operation. If the full-sized plant is needed in 1997, pilot plant work should start in 1991.

The process developed for this pilot plant may not be the best of all possible means for cleaning pit water. It is, however, simple and effective, and it relies on well-understood methods. The pilot plant is intended to have a high degree of flexibility so that other promising methods can be tried and evaluated for use at any stage of the process.

This pilot plant is intended to help finish research directed toward developing a practical process for treating pit water to produce water meeting applicable drinking water/discharge standards and to recover the valuable metals. Since the volume to be treated is large and a plant must run for many years, simple processes are preferred over more advanced ones that require careful control and highly skilled operators.

FINANCIAL ASSESSMENT:

Costs appear reasonable; they include:

Salaries and wages	\$ 65,833
Employee benefits	21,725
Contracted services	33,885
Supplies and materials	11,900
Communication	800
Rent and utilities	11,200
Equipment	144,036
Miscellaneous	<u>10,500</u>
 TOTAL	\$ 299,879

The preliminary design, including equipment specifications and cost estimates, was prepared by Montana Tech engineering personnel. Design assumptions and methods reflect commonly accepted practices.

There are no funds being contributed by the applicant or other sources.

ENVIRONMENTAL EVALUATION:

The construction and operation of this pilot plant would have little direct effect on the environment, although the ultimate objective, a full-sized treatment plant, is intended to prevent a major degradation of water quality extending downstream from Butte through the entire Clark Fork Valley.

The pilot plant would be located at the Mineral Research Center. Other pilot plants have been and are being operated at the center, developing processes applicable to coal cleaning, metal and nonmetallic ore processing, and environmental cleanup.

The only new construction would be that of the on-site sludge and clean water ponds, both of which would be lined to prevent leakage. These would be 60 by 60 feet and 39 by 39 feet in size, respectively. The ponds are designed with ample capacity to hold spills and product water of suspect quality, as well as waste sludge and water for process use.

PUBLIC BENEFITS ASSESSMENT:

The purpose of this plant is to provide information sufficient for detailed design, including cost estimation, of a full-scale plant. As such, the main measure of success would be the eventual ability of the plant to routinely treat pit water and produce clean water. In order to do this, the operators would have to thoroughly understand all the operating variables in the plant. These include throughput rates at all stages of treatment, reagent dosages and best points of reagent addition, effects of auxiliary reagents such as alternate oxidants and flocculants, and required residence time in all stages. In addition, various operational problems would arise and must be controlled if the plant is to run smoothly and efficiently.

The plant would be a success if the plant performs its task of cleaning pit water and the plant personnel can explain thoroughly and plainly the methods used.

RECOMMENDATIONS:

No funding is recommended for this project. Although the department recognizes and supports the need for evaluation of new technology for treatment of Berkeley Pit water, the department questions whether RDGP is an appropriate forum for this activity. It would appear that Berkeley Pit solutions are better confined to regulatory agencies and the responsible party, with appropriate opportunity for public review and comment. Additionally, the department has recommended funding for Butte-Silver Bow's WASTEC application. The concept of WASTEC would appear to accommodate the type of proposal described by Montana Tech.

APPLICANT NAME: Montana Department of State Lands (DSL)

PROJECT/ACTIVITY NAME: Cataract Creek Reclamation Project

AMOUNT REQUESTED: \$ 171,771

OTHER FUNDING SOURCES AND AMOUNTS: None

TOTAL PROJECT COST: \$ 171,771

PROJECT DESCRIPTION:

The Cataract Creek Reclamation Project includes three sites located in the Cataract Creek drainage in Jefferson County, Montana. Cataract Creek is a tributary of the Boulder River. The mines included in the project are the Crescent Mine, located in the headwaters of Cataract Creek, and the Morning Glory and Mantle Mines, located in downstream positions near the confluence of Cataract Creek with the Boulder River.

The purpose of the project is to correct environmental and public health problems due to mine wastes lying adjacent to Cataract Creek and its tributaries. The mine dumps and associated workings create environmental hazards by contributing contamination to surface waters in the form of dissolved metals and fine grained material. This contamination enters the surface water system by various mechanisms including direct discharge of mine waters from underground workings, seeps emanating from the base of tailing and rock dumps as a result of poor drainage characteristics and minimal vegetative cover, and erosion and transport of fine grained sediment from dumps adjacent to ephemeral and perennial streams.

The proposed reclamation plan includes removing debris, removing and regrading mine waste, applying lime, providing topsoil, installing a drainage system, fertilizing and seeding, applying vegetative mulch and erosion control blankets, and installing fence. Reclamation at the project site is intended to result in an improvement in water quality in Cataract Creek and the Boulder River, elimination of safety hazards, and improvement of the aesthetics of the area.

TECHNICAL ASSESSMENT:

Stream sampling for water quality and flow measurements by the Montana Department of Fish, Wildlife and Parks (DFWP) determined that Cataract Creek is the largest source of copper and zinc to the Boulder River. At the mouth of Cataract Creek, in the spring and early summer of 1985 and 1986, zinc and copper

concentrations ranged from less than detection to 0.45 mg/l and from 0.01 to 0.10 mg/l, respectively. Amounts of zinc and copper loading per day ranged from 1.8 to 85.0 kg/day and 0.24 to 37.3 kg/day, respectively. Aquatic life in Cataract Creek is particularly vulnerable to metals toxicity due to the low pH, hardness, and alkalinity of the water. In 1986, the U.S. Environmental Protection Agency's aquatic life standards for zinc and copper were exceeded by an average of ten times and seven times the recommended concentrations, respectively.

At this time, no health hazards directly related to water quality in Cataract Creek or the Boulder River have been established. However, human health hazards do exist in the proximity of at least one site (Morning Glory), due to elevated levels of metals concentration in fine-grained mill tailings. The most obvious and principal effect of mine pollution in the drainage has been a reduction in the aquatic life standards for the river.

Further investigations of Cataract Creek basin have identified several abandoned mine sites that contribute significant amounts of contamination to Cataract Creek. The sites, listed in order of decreasing impact to the basin's watershed, are Crystal Mine, Morning Glory Mine and Mill, Eva Mae Mine and Mill, Mantle Mine, and Crescent Mine. In 1987, DFWP applied for and received a small (\$21,565) RIT grant for reclamation activities on the Crystal Mine. Lack of landowner cooperation has excluded the Eva Mae Mine and Mill from the pending grant application.

DSL has generally documented the environmental, health, and safety hazards present in the Cataract drainage basin. However, more site-specific data, particularly water quality data, are needed. Design criteria for reclamation at the Crescent Mine are noticeably missing, as is a detailed monitoring plan to judge project performance. Without these data, the effectiveness of the various designs treatments is speculative at best.

FINANCIAL ASSESSMENT:

DSL is requesting grant funds for the entire amount of the project (\$171,771). All services for this project would be awarded to qualified contractors and engineering consultants. Generally, the budget breaks out as follows:

Engineering/administration	\$ 29,231
Construction	132,540
Monitoring	<u>10,000</u>
TOTAL	\$ 171,771

Engineering--i.e., final design, permitting, bidding, inspection, and administration--is overestimated given the remaining work to be performed. Additionally, construction time frames listed for this project are too long (four and one-half months). Significant savings could be attained by starting construction in late August or early September, which would still allow for fall seeding (30-45 days). Construction cost estimates seem high but fluctuate widely. They are not excessive. Monitoring costs cannot be evaluated due to lack of information. Assuming two or three sample points at each site and adequate frequency, duration, and analysis to judge project performance, monitoring should be attainable for \$10,000. Though DSL has obviously spent considerable funds in site assessment and design activities, these contributions are not listed.

ENVIRONMENTAL EVALUATION:

Short-term impacts, primarily sedimentation, can be mitigated by careful design, scheduling, and adherence to permit requirements. Short-term adverse impacts such as dust emissions, noise, and an increase in traffic may occur during the reclamation process. Long-term adverse impacts are not foreseen.

Net improvements to the environment--i.e., water quality, aquatic organisms, vegetation, and wildlife habitat--are unknown. However, long-term environmental impacts from the reclamation would be positive and include improved water and land quality. Wildlife and fisheries would potentially benefit from the project by the creation of more habitat through revegetation and water quality improvement. The extent of expected benefits is not clear.

PUBLIC BENEFITS ASSESSMENT:

Reclamation activities at the proposed site are intended to benefit downstream domestic and agricultural water users through improved water quality. The public would benefit from an increase in recreational areas and opportunities because of the regraded and revegetated lands, which would create additional wildlife habitat. Finally, private individuals or public agencies proposing to reclaim areas with similar disturbances could use the results of reclamation techniques employed at the project site to assess adequacy and effect.

RECOMMENDATIONS:

No funding is recommended for this project.

APPLICANT NAME: Montana College of Mineral Science and Technology/Department of Biological Sciences

PROJECT/ACTIVITY NAME: Constructing Artificial Bogs and Wetlands in the Uncle Sam Gulch/Cataract Creek Area to Remediate Present Damage and Mitigate Future Damage Due to Acid Mine Drainage From the Crystal Mine, Northern Jefferson County, Montana

AMOUNT REQUESTED: \$ 239,877

OTHER FUNDING SOURCES AND AMOUNTS:

Applicant	\$ 73,975
Job Corps (still negotiating)	\$ 125,000

TOTAL PROJECT COST: \$ 438,852

PROJECT DESCRIPTION:

Solving problems of acid mine drainage (AMD) has become a priority for communities across Montana: the damage wrought upon the environment where past mining activities have taken place has adversely affected the economy of the state, the health and safety of its residents, and, in many cases, entire regional ecosystems (the upper Clark Fork basin is a case in point). AMD also occurs in alpine riparian environments where remote mining activities have taken place (and continue to take place), often with major detrimental effects on the environment. The drainage below the Crystal Mine in Northern Jefferson County exhibits just such damage. Uncle Sam Creek, into which AMD from the Crystal flows, is for much of its length devoid of aquatic life, and the streamside habitat is also in poor condition. The water is loaded with heavy metals (arsenic, zinc, and iron) and suffers from very low pH (2.8 to 3.5) and heavy turbidity.

A three-year technology demonstration project is proposed to mitigate AMD damage to the Uncle Sam Gulch drainage and demonstrate a low-cost, low-maintenance method that may be used in similar situations elsewhere in the state. The project would first characterize the present conditions in Uncle Sam Gulch as they relate to the presence of AMD. Then a series of artificial bogs and wetlands would be designed and constructed to entrap the contaminants and treat them in a series of circuits that imitate the chemical cleansing activities of naturally occurring bogs and wetlands that have precipitated iron and other metals and neutralized highly acidic water flowing through them. The installations would be constructed in a series of relatively

small cells with anticipation of the periodic need to replace the organic substrate (the "boggy" material) once it becomes saturated with contaminants.

Work would begin in July 1991 and would continue seasonally on site and year-round for the planning and development phases. Construction would take place in the second year and, if necessary, extend into the third year. The third year would focus on monitoring the effectiveness of the systems, fine-tuning them to optimize their operation, and disseminating results as widely as possible for the greatest benefit of the public.

TECHNICAL ASSESSMENT:

The proposal has several major shortcomings. First, the applicant does not discuss previous research concentrating on treatment of AMD in Montana or elsewhere. These data and research findings are critical to the design of AMD treatment systems.

Secondly, the proposal does not explain why a passive system (wetlands) is the preferred alternative for this site. Active treatment systems and use of hydrologic controls were not considered, or only very briefly. Additionally, the rationale as to why wetlands are the preferred passive treatment for this site is not clear. Increased discussion on the benefits and liabilities of other passive systems--e.g., neutralization, aeration, biosorption, chemical adsorption, etc.--at this site is needed.

Thirdly, the design of the wetland system being proposed is unclear. An evaluation of previous wetland construction in Montana and other states is needed to properly design the system proposed here. Numerous difficulties, other than those generally alluded to by the applicant, have been encountered elsewhere. It appears that the applicant's proposal is very similar to research at the Big Five Tunnel initiated in 1987 by the Colorado Department of Health and Colorado School of Mines, and, if so, the applicant should draw on this experience in designing the current project.

In summary, the proposal is not clear in revealing why the proposed system was chosen or exactly how it would be designed, constructed, maintained, and monitored.

FINANCIAL ASSESSMENT:

The RDGP budget is broken down as follows:

Salaries and benefits	\$ 159,467
Contracted services	33,750
Supplies and materials	6,500
Communications	3,900
Travel	8,310
Rent and utilities	2,400
Equipment	15,050
Miscellaneous	<u>10,500</u>
 TOTAL	\$ 239,877

Salaries and benefits (principal investigator, \$69,528; graduate students, \$60,300; and secretary, \$29,639) are high, particularly given the amount of published work on wetland construction. A literature search and evaluation should have been conducted before selecting the technology and design for this project. Air travel and per diem to three national meetings (\$3,750) are not adequately justified, nor are equipment expenditures of \$15,050. In short, the budget leaves many unanswered questions as to need and reasonableness.

ENVIRONMENTAL EVALUATION:

The project involves construction activity in a stream channel and as such would be expected to have short-term impacts primarily associated with sedimentation. Impacts may be associated with substrate material--i.e., stock manure and sewage sludge; these need to be evaluated by regulatory agencies. Careful design, regulatory oversight, and timing of construction should mitigate these impacts. The question of substrate disposal needs to be evaluated by the Department of Health and Environmental Sciences as to the presence of potentially hazardous substances.

Overall, the project is intended to have a positive long-term impact on water quality, aquatic life, and recreation. A successful project would realize these objectives.

PUBLIC BENEFITS ASSESSMENT:

The public benefits of a successful project would be both immediate and far reaching. The project aims to rehabilitate a seriously damaged riparian habitat. It would provide jobs and job training in the construction phase and could possibly open more mining opportunities if a low cost method of mitigating impacts from mining activities is achieved. However, the potential for success for this project is low because of technical shortcomings in the proposal.

RECOMMENDATIONS:

No funding is recommended for this project.

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APPLICANT NAME: Montana College of Mineral Science and Technology

PROJECT/ACTIVITY NAME: Detoxification of Acid Mine Drainage from Berkeley Pit Waters Using Chelation Affinity Chromatography

AMOUNT REQUESTED: \$ 269,710

OTHER FUNDING SOURCES AND AMOUNTS:

Applicant	\$ 12,000
Industrial donors	\$ 33,320
(Funding for related project requested from the U.S. Environmental Protection Agency-- no estimate of time for decision)	

TOTAL PROJECT COST: \$ 315,030

PROJECT DESCRIPTION:

The natural oxidation of metal sulfide ore bodies in abandoned and working metal mines produces sulfuric acid laden with dissolved toxic metals such as lead, cadmium, copper, arsenic, and others. This acid drainage can adulterate the surface water and aquifers to cause environmental problems at abandoned and active mine areas. Recent fish kills in the Clark Fork River drainage were traced to spillage of such metals from abandoned settling ponds of former mining activities. The Berkeley Pit in Butte, Montana, is part of a very large Superfund site and is filling with this acid mine water at the rate of over 7 million gallons per day. The metals in this water must be removed to allow downstream discharge into the headwaters of the Clark Fork River. Addition of lime solution can remove most of the metals, but the process leaves a residual sludge that must be disposed. Counter current extraction with organic chelating solutions is another method of treatment. This process can contaminate the water with organics due to foaming, emulsion formation, and other interfacial problems.

ChromatoChem, Inc., has developed a method of immobilizing a chelating group on a solid silica support. Initial studies indicate that use of this stationary support will remove metals

without the problems associated with the liquid extraction process mentioned above. The purposes of this proposed research are to:

1. Build and demonstrate a small pilot plant with a feed rate of one gallon per minute of water from the Berkeley Pit
2. Determine the feasibility of this process for removing metals from mine waters and allowing direct discharge into the surface system
3. Obtain engineering data for plant design and commercialization by interested parties

In addition, the stability of the support and use of various chelating groups on the support would be studied.

The anticipated results of this proposed research are to:

1. Show the practicality for the removal of toxic metals from acid mine drainages, yielding an environmentally acceptable discharge into surface waters
2. Obtain a concentrated solution of the metals that may be further treated (electrowinning) to recover the metal values

TECHNICAL ASSESSMENT:

ChromatoChem, Inc., the co-investigator, has proprietary technology for immobilizing chelating agents on silica supports. The technology involves coating a porous silica surface with a chemically stable hydrophilic polymer linker molecule. The terminus of the linker is activated and then coupled with an appropriate chelating molecule.

The objective of this research is to demonstrate this chelation technology in a small pilot plant operation and obtain engineering design data to develop a scaled-up process for commercialization. The anticipated result is the development of a process to remove heavy metals from acid mine waters. The metals separation and concentration steps of the process could conceivably make metal recovery an economically viable process. Economic feasibility will be reviewed and evaluated by industrial partners who are interested in commercialization or use of the technology. Commercialization time frames are not mentioned.

Overall, there is general agreement that this type of project, along with others, is needed before Berkeley Pit waters enter underground aquifers and surface water of the upper Clark Fork River basin. There are numerous alternatives for treating Berkeley Pit waters, however, that are not adequately addressed in this proposal, implying that this research is the only viable alternative. It would help answer some of the questions about

the extraction of metals by silica, but whether this technology is the most viable solution or alternative is conjecture at this point. Without the results of intensive field investigations, laboratory analyses, and data evaluations of these alternative technologies, which are noticeably absent from this proposal, reviewers are hesitant to recommend the level of funding requested here.

An additional point to consider is that the U.S. Environmental Protection Agency (EPA) must select the appropriate technology alternative pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act.

Other concerns, briefly, center on analytical parameters of the high performance liquid chromatograph (HPLC), level of coordination with the Department of Health and Environmental Sciences and EPA, equipment purchases, salaries and wages, public vs. private benefits, location and function of two laboratories, need and urgency, number of separation columns, level of involvement by various researchers, and outside funding sources. In general, the proposal is loosely defined and needs further clarification and expansion in a number of areas.

FINANCIAL ASSESSMENT:

The budget breakdown submitted does not provide sufficient detail to evaluate its reasonableness. For example, under Contracted Services is the statement that "laboratory personnel, equipment and space are being leased at a cost of \$45,000," when personnel are already budgeted under Salaries and Wages. Laboratory space would also be rented at Montana Tech for \$1,000/month. This creates confusion as to where the research would be conducted and by whom. If the research would be conducted at Montana Tech, it seems that spending \$70,000 to purchase the HPLC and associated pumps and columns is unwarranted. Given the amount of use it would receive in this project, it should be rented. (The inductively coupled plasma [ICP] and atomic absorption [AA] instruments, which would be used more than the HPLC, are being rented for a cost of \$9,000.) The level of effort and duties (salaries and wages) were not explained for the following: principal investigator (\$14,500), laboratory chemist (\$12,000), co-investigator (\$3,000), technician (\$15,000), secretary (\$15,000), and student help (\$16,000). The cost of silica (\$5,000/kg) seems excessive.

Additional contributions from industrial donors (\$33,320) and EPA are uncommitted presently. The applicant lists \$12,000 as its contribution (4 percent of the overall project cost). Scale-up of this process is dependent on yet unidentified parties.

ENVIRONMENTAL EVALUATION:

No adverse environmental impacts are anticipated during this research project.

PUBLIC BENEFITS ASSESSMENT:

Public benefits of this project are difficult to quantify. It would provide useful information to agencies and other researchers searching for viable acid mine drainage treatment alternatives. If results of this research lead to successful commercialization, the public benefits would then be a function of site-specific conditions and cost-effectiveness. In the project as proposed, it would appear that most benefits would accrue only to the private company cosponsoring the project.

RECOMMENDATIONS:

No funding is recommended for this project.

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APPLICANT NAME: Montana State University (MSU),
Department of Animal and Range Sciences

PROJECT/ACTIVITY NAME: Pyrite Amendments to Improve Plant and
Animal Nutrition

AMOUNT REQUESTED: \$ 96,114

OTHER FUNDING SOURCES AND AMOUNTS:

Applicant	\$ 80,300
Placer Dome Mine and Golden	\$ 9,200
Sunlight Mine	

TOTAL PROJECT COST: \$ 185,614

PROJECT DESCRIPTION:

The applicant proposes to demonstrate the use of a mine waste (concentrated pyrite) as a resource to increase plant sulfur uptake, which should then potentially increase yield and oil quality of canola and increase sulfur content of native range plants. The latter would potentially improve the diet quality of cattle grazing native range and crop aftermath during the fall and winter.

Pyrite is an iron sulfide mineral that commonly occurs in many nonferrous metal mining operations. Although it can be separated during the mineral extraction process, pyrite is usually discharged in tailings with other waste materials and thus is not considered a resource in the United States. However, pyrite has reputedly been successfully used in Europe, Australia, and India as a plant nutrient source for iron and sulfur. It is also used to reclaim saline and sodium-affected agricultural soils.

In Montana, tailings impoundments of non-operating mines contain significant amounts of pyrite that are a potential source of acid drainage. For operating mines with pyritic tailings, pyrite can be separated from waste streams and potentially used as a resource rather than becoming a potential source of acid generation and subsequent contamination.

The applicant intends to demonstrate the usefulness of pyrite as a source of sulfur for plant and livestock nutrition. Pyrite applied at appropriate rates to range and croplands may benefit range and crop plants by increasing plant sulfur uptake and soil micronutrient availability, and may increase sulfur intake by animals. In this proposed project, range and crop plants would be amended with pyrite or gypsum, a traditional sulfur source. The amount of pyrite applied would be determined by loading rate guidelines for contained metals. Plant growth and nutrient content would be determined at seasonal intervals for range and crop species. In turn, the amended range plants would be evaluated for their potential as an organic sulfur supplement for livestock.

Specific project objectives are to demonstrate:

1. The effectiveness of pyrite and gypsum sources of sulfur in increasing plant sulfur uptake
2. How enhanced sulfur uptake increases the yield and oil quality of canola
3. How enhanced sulfur uptake affects the phenology, structure, productivity, and sulfur content of native range
4. How enhanced sulfur in plants affects diet quality and grazing behavior of cattle grazing native range and crop aftermath

TECHNICAL ASSESSMENT:

The problems are fairly well outlined, and most technical aspects of this proposal appear to be detailed. However, there are several concerns about the project. For example, the

question of toxic metals or other contaminants in the pyrite is not addressed adequately. The proposal briefly mentions a potential for adverse effects from metal loading with pyrite applications. The pyrite from the Golden Sunlight Mine is supposed to have only minor amounts of metals. This is the only source that would be tested; a sampling of pyrite from other mine wastes is not planned.

Although the proposal would thoroughly investigate the effects of sulfur fertilization on canola production, the proposal makes a generalization about investigating the phenology, structure, productivity, and sulfur content of native range. Native range is usually composed of a diverse plant community. The proposed study would investigate the effects of sulfur fertilization on only two native range grass species, bluebunch wheatgrass and Idaho fescue.

The study plan is designed to meet most of the stated objectives, but some of the reasons for planned activities are not explained. The applicant does not explain why the use of gypsum, a traditional sulfur source, is needed to demonstrate the value of pyrite. The use of gypsum would be helpful in comparing the effects of traditional and nontraditional sulfur fertilizers on soil pH. This comparison should have been a stated objective in the proposal. Also, the reasons for the nitrogen fertilization treatments are not explained, and the treatments add significantly to the complexity of the study. These seemingly extraneous nitrogen treatments appear to answer questions not directly related to the problems of acid mine drainage from pyrite, canola production, and livestock nutrition.

Because of the poor discussion of alternatives in the proposal, reviewers were not able to identify the tradeoffs incurred in choosing among a set of alternative investigation strategies. This is a major deficiency in the proposal. The proposed alternative appears to be a "shotgun" type of research with many different treatment combinations and measurement parameters. The proposal, reviewers felt, could be designed with fewer variables and measuring devices.

Lastly, an important issue to address in studying the feasibility of pyrite application is the cost of transport of the material in quantities large enough to significantly reduce acid production at mine sites. The statement that "transportation and application would be minimal costs incurred by the user" is not well supported. Since transport and other costs are a main factor in assessing project economics, they need to be well described and documented.

FINANCIAL ASSESSMENT:

The budget appears to be reasonable for the work proposed. The highest costs are 43 percent for salaries and wages and 41 percent for contracted services. The RDGP cost breakout is shown next.

Salaries and wages	\$ 41,300
Benefits	2,360
Contracted services	39,444
Supplies and materials	5,100
Communications	1,100
Travel	2,450
Rent and utilities	360
Equipment	2,000
Miscellaneous	<u>2,000</u>
TOTAL	\$ 96,114

ENVIRONMENTAL EVALUATION:

The potential positive environmental impact would be removing a source of acid contamination from waste piles and dispersing and diluting it over the landscape. Reviewers were doubtful that there would be large enough quantities of pyrite removed to have a positive effect on water quality. It is possible that agricultural productivity and range vegetation would be improved. There is a potential for adverse effects from metal loading with pyrite amendments. MSU states that application rates would be well below U.S. Environmental Protection Agency guidelines, but there are no details on these safeguards.

PUBLIC BENEFITS ASSESSMENT:

Plant productivity could be increased, contributing to more efficient canola and beef production. If the pyrite waste adds sulfur to the soil, the need for energy-intensive traditional fertilizers could be reduced. A feasible project could potentially benefit both the agriculture and mining industries. The removal of pyrite from waste piles would reduce the risk of water pollution, but there is doubt by reviewers that demand for pyrite would be high enough to result in the removal of enough of the waste to have a measurable effect on water pollution.

RECOMMENDATIONS:

No funding is recommended for this project.

APPLICANT NAME:

Yellowstone County

PROJECT/ACTIVITY NAME:

Yellowstone County LIS/GIS Project

AMOUNT REQUESTED:

\$ 284,633

OTHER FUNDING SOURCES AND AMOUNTS:

Applicant	\$ 311,297
Soil Conservation Service	\$ 8,454

TOTAL PROJECT COST:

\$ 604,384

PROJECT DESCRIPTION:

Yellowstone County is proposing to develop a county-wide Land Information System/Geographic Information System (LIS/GIS). A LIS/GIS is an automated database used to store, update, manipulate, and display all types of spacial information. Examples of types of information that can be part of a GIS are floodplain maps, irrigation districts, land zoning boundaries, sewer systems, and comprehensive plans. Statistics show that approximately 90 percent of the decisions by the Yellowstone County government involve geographic information.

The following items are a description of the tasks to be accomplished.

1. Train two Yellowstone County employees in the Global Positioning System (GPS), a uniform three-dimensional system of surveying that uses a satellite to plot the grid system. This system will allow the county to coordinate databases with various federal agencies.
2. Identify hardware and system software that can merge with the existing system while quantifying specific application needs. Purchase and install hardware.
3. Train three county personnel in the operations of the LIS/GIS and database management functions.
4. Convert spatial data and attributes into a digital form that can be used by LIS/GIS. This includes digitizing the features found in orthophoto quads, printed maps, and aerial photographs and translating existing digital data into a GIS.

5. Maintain, improve, expand, update, and revise any portion of the GIS-based system. This objective takes into account that ongoing staff training will be required in order to be successful.

TECHNICAL ASSESSMENT:

Without question, an interdepartmental GIS would be beneficial for Yellowstone County. By implementing a GIS the applicant would be breaking new ground in Montana and serving as an excellent case study for other counties. It appears there is considerable support for the GIS project among various county departments, which is crucial to a successful project.

The process by which the county would develop a GIS is not well documented in the application. In general, the county has not presented a clear plan of how it would proceed with the project. For instance, the applicant did not identify which department would be served first. No pilot project to get the GIS off the ground is specified. Early products to be produced by the GIS, and how these products would directly relate to current county functions and operations, are not stated.

Reviewers' experience with other GIS projects has shown that the county's time lines are probably too short. For example, four months to convert "all" spatial information is unrealistic, as are one month for GPS survey computations and two 1-month intervals for staff training.

Another major concern is training. If designated staff would go to off-site training to learn a specific (but undefined) software product, the travel budget is too low. On the other hand, if the county would rely on consultants to conduct training on site, there could be an overdependence on outside people. This could hinder the chances of the county's developing sufficient in-house expertise to implement a successful GIS in the long run.

The staffing plan also caused some concern. The personnel services budget indicates that a data processing coordinator would handle the GIS as part of other duties. This underestimates the amount of work involved in getting a GIS up and running, maintaining its functions, and serving the diverse applications that will arise. A full-time GIS coordinator for the county is recommended. The coordinator should have interdepartmental authority, perhaps reporting directly to the commissioners.

In summary, it was found that the technical aspects of this proposal were somewhat difficult to assess. There is a lack of detail specific to Yellowstone County. There is ample

information about the benefits of a GIS in general, and how those benefits would serve the county. How the project would unfold and be implemented are not clearly outlined.

FINANCIAL ASSESSMENT:

The RDGP portion of the budget is:

Contracted services	\$ 46,800
Communications	4,800
Travel	1,758
Rent and utilities	14,120
Equipment (hardware and software)	<u>217,155</u>
 TOTAL	\$ 284,633

In general, the budget is loosely documented. It was not possible to evaluate all the costs since the applicant has not defined system needs and requirements. Presumably, the applicant has done some research toward defining system needs, but these calculations are not included in the application. Specifically, there is no detail on the \$289,540 investment for hardware and software, 75 percent of which would be paid by the grant. Also, it appears there was no money budgeted for hardware to link all county departments.

ENVIRONMENTAL EVALUATION:

The proposed project won't result in the construction of facilities or any activity that would negatively impact the environment. Positive impacts would be expected from better land and natural resource management decisions based on the improved data and maps obtained through the LIS and GIS.

PUBLIC BENEFITS ASSESSMENT:

Overall, this application begins to define an excellent project for Yellowstone County, and the county planners should be applauded for making a move in the direction of automation and a GIS. The primary beneficiary of this proposal would be Yellowstone County and its resident taxpayers. For them, there is a need to develop GIS capability, and from the standpoint of computer advancements (i.e., the longer one waits, the harder it will be to implement this type of system), it is somewhat urgent for the county to develop a GIS.

While it is true that there would be concrete benefits resulting from this project, it is not clear what would happen or how the county would proceed if grant funds were not made available. The relationship between county functions and reclamation or environmental issues is not described.

An RDGP grant could divert attention from the substantial long-term costs of sustaining a GIS. The costs of a GIS-based system continue. Long-term staffing changes must be made consistent with the move to GIS-based operations, jobs must be redefined, and all departments must budget for GIS tasks in the long term.

RECOMMENDATIONS:

No funding is recommended for this project.

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APPLICANT NAME: Homestead Acres Water and Sewer District

PROJECT/ACTIVITY NAME: Bootlegger Mine Reclamation Project

AMOUNT REQUESTED: \$ 300,000

OTHER FUNDING SOURCES AND AMOUNTS:

Applicant \$ 12,204

TOTAL PROJECT COST: \$ 312,204

PROJECT DESCRIPTION:

This application is being presented by Montana Peoples Action and the Mountain Patrol Search and Rescue of Cascade County. Both are not-for-profit organizations seeking a resolution to a long standing safety and health hazard to the community of Bootlegger Trail. Sponsorship for this grant was sought and obtained from the Homestead Acres Water and Sewer District.

The site is located approximately 3 miles north of Great Falls on the Bootlegger Trail. It consists of an abandoned surface mining operation locally known as the "shale plant," which was used in the past for extracting and processing shale aggregate used in lightweight blocks and prestressed concrete beams.

The applicant proposes to totally reclaim the site into a natural habitat for private, public, or commercial use. Construction includes the removal of all man-made fixtures, pits, pilings, and wastes above and below ground. A site study to determine the existence of man-made fixtures, deposits, or wastes not visually evident and the removal and disposal of those wastes may have to be completed.

The project involves surface contouring, re-establishment of native and introduced vegetation, and the addition of top soil to ensure vegetation survival.

Once completed, the restoration of this site would eliminate potential environmental concerns regarding groundwater quality, erosion, runoff onto the agricultural lands and wetlands to the south, and health hazards from the structures present. Increased wildlife habitat and improved aesthetics and water quality are some of the stated benefits.

Construction activities would be performed by reclamation contractors and supervised by designees of the Mountain Patrol Search and Rescue (vested owner of the property).

Progress reports, supervision, accounting, and documentation would be performed by the search and rescue organization.

TECHNICAL ASSESSMENT:

The application provides few specifics regarding reclamation options and associated costs. The general nature of work proposed involves removing and disposing of wastes, debris, etc.; recontouring; topsoiling; and revegetation--all of which are relatively straightforward, basic approaches to reclamation and site cleanup. A contractor's construction cost estimate (\$348,000) provided by the applicant is excessive for the work being proposed. Substantial cost savings could be expected in recontouring and topsoiling, for instance. No mention is made of how the sale of salvageable materials could help offset construction costs. The ultimate use of the reclaimed land is not identified.

Beyond the obvious technical deficiencies in the work plan, however, are the issues of public benefits, crucial state need, and project urgency. Arguments supportive of these benefits and needs are not persuasive.

The land parcel proposed for cleanup was donated to Mountain Patrol in June 1984. Mountain Patrol intended to salvage salable materials and use the land as a financing tool for search and rescue operational costs, etc. Using the funds received from salvage for land improvement and cleanup is not mentioned. Certainly an influx of public funds would accelerate and improve the financial condition of Mountain Patrol--principally in terms of increased land value and decreased liability for potential property-related injuries and nuisance actions. Whether this is a crucial state need and is urgent to others besides the search and rescue unit is doubtful.

In summary, the general consensus of reviewers evaluating this proposal is that private improvements are not an intended goal of RDGP. The responsibility for land improvement and cleanup was undertaken by the owner at the time of deed conveyance and should not be relieved by RDGP funding.

FINANCIAL ASSESSMENT:

Cost estimates are not documented in sufficient detail to assess their reasonableness. One estimate apparently given by an area contractor does not describe how cost estimates were derived. For example, an estimation of the quantity of work to be completed (in cubic yards excavated, acres revegetated, acres topsoiled, cubic yards hauled, etc.) and use of a unit price bid from similar projects are needed. Material and work requirements would require appropriate and standard engineering practices. This information is specified by RDGP in its application requirements. In short, these requirements were not followed.

ENVIRONMENTAL EVALUATION:

One goal of the project is to return the area to its natural condition. In doing so, water, soil, vegetation, and wildlife habitat should improve. Minor short-term impacts would occur during construction activities, principally noise, dust, and pollution from construction equipment, and soil and vegetation disruption from equipment and workers going to and from the site. Two other potential reclaimed uses were listed, also, including a rural home site and a public park. Though impacts to these uses should be short-term and minimal, not enough information was provided in the application for a full evaluation.

PUBLIC BENEFITS ASSESSMENT:

Site improvements would improve local aesthetics and reduce the potential for off-site impacts on soil, water, and vegetation. Benefits could accrue to residents of a neighboring subdivision who contend the project site is an eyesore. Indirectly, the search and rescue unit would be better able to direct funding received (from donations and salvage) to its service operations rather than to site cleanup.

RECOMMENDATIONS:

No funding is recommended for this project.

APPLICANT NAME:

Judith Basin County

PROJECT/ACTIVITY NAME:

Development of Iron Ore Deposit

AMOUNT REQUESTED:

\$ 297,000

OTHER FUNDING SOURCES AND AMOUNTS:

U.S. Forest Service	\$ 15,000
EKPA, Inc. (private)	\$ 15,000

TOTAL PROJECT COST: \$ 327,000

PROJECT DESCRIPTION:

EKPA, Inc., is the holder of 43 patented iron ore claims near Stanford, Montana. The corporation is proposing to use RDGP funds to determine the quality and quantity of this deposit, commonly referred to as the Running Wold Iron Ore Deposit. If the results of this survey and core drilling program are encouraging, EKPA plans to contract for professional consultants who would then conduct an economic feasibility analysis relative to siting a direct reduction iron plant and/or steel mill. An environmental assessment of mining the ore body and constructing and operating a reduction plant and/or mill would also be performed, as would a feasibility study to evaluate construction of a 15-mile-long railroad connecting the plant to Burlington Northern facilities at Stanford. An intended projected strategy is to attract investors using feasibility data and information.

The project concept involves creation of jobs, increase in the state and federal tax base, and improvement to Judith Basin County's overall economy. The applicant (county) would not be involved directly or indirectly. Administration of grant funds would be handled by the local Resource Conservation and Development (RC&D) office.

TECHNICAL ASSESSMENT:

The applicant and EKPA, Inc., maintain that the project is critical to Montana's economy and represents an opportunity to capture extraordinary benefits that would otherwise be lost. Although the application lacks required documentation from authoritative sources supporting this claim, it is not difficult to realize that job creation and expanded economic opportunity benefit all Montanans. Rather, the difficulty is in determining, from the sketchy information presented, what the likelihood is that this particular project would fulfill these needs.

Detail is insufficient in all aspects of the proposal--i.e., public benefits, technical description, budget, need and urgency, and project management and organization. With the exception of the technical description and associated construction budget (which would be detailed during the feasibility and design phases using RDGP funds), this information should be available. Though time consuming, gathering this information and supporting documentation is critical to assessing project success.

The unknown quality and quantity of the reserves and the limited financial commitment risk by EKPA are seen as major drawbacks in this proposal.

FINANCIAL ASSESSMENT:

The budget lacks documentation. All expenses--salaries, benefits, travel, equipment, etc.--are shown in a lump sum under the Contracted Services category. No information is given as to how the contractor costs were derived. Determining the quantity and quality of the ore deposit would cost \$57,000. The remaining \$240,000 in the budget is for the following studies: economic feasibility, marketing, project design, and environmental impact.

ENVIRONMENTAL EVALUATION:

The exploration (core drilling) phase of this project poses potential impacts to the environment. Such activities would be governed by the Department of State Lands, Reclamation Division. Adherence to permit requirements and/or enforcement of same would mitigate these impacts. The feasibility phases of this project are not expected to directly impact the environment. If the project progresses to construction, Montana Environmental Policy Act provisions would apply, and permits and licenses would be required from appropriate regulatory agencies.

PUBLIC BENEFITS ASSESSMENT:

The public benefits claimed are the generalizations that jobs would be created and the local, regional, and state economies benefited. Verification of these benefits or the methodology used to make this claim is not possible from the information submitted. It does appear that private benefits would accrue to EKPA in that corporation funds would not have to be spent assessing the project's feasibility.

RECOMMENDATIONS:

No funding is recommended for this project.

APPLICANT NAME: Montana State University (MSU),
Department of Biology

PROJECT/ACTIVITY NAME: Trout Stream Restoration from Placer
Mining and Flood Damage

AMOUNT REQUESTED: \$ 91,438

OTHER FUNDING SOURCES AND AMOUNTS:

Applicant \$ 43,994

TOTAL PROJECT COST: \$ 135,432

PROJECT DESCRIPTION:

The applicant proposes to further evaluate results of a previous fish habitat improvement project funded by a 1985 RIT grant. Located near Townsend, this 1985 project was completed in 1988 and involved installation of 40 log sills, to help restore trout habitat from placer mining damage in Confederate Gulch, and installation of riprap and tree revetments, to help stabilize severely eroding streambanks in Deep Creek. Funding for evaluation of both projects will expire in spring 1991. The objective of this current proposal is to obtain funds to complete the postconstruction evaluation for three years using established monitoring procedures and equipment.

TECHNICAL ASSESSMENT:

The applicant's methods for trout stream restoration and bank stabilization offer some needed new approaches to fish habitat enhancement. Postconstruction physical changes will continue to develop for many years following construction of the project. Therefore, to continue monitoring for three years may be too brief a period. There is a general feeling that less detailed monitoring for a longer period would be more appropriate. For example, evaluation could take several approaches:

1. Evaluate the overall effectiveness of the project approximately 10 years (and several major flow events) after initial construction (a one-time-only basis), or
2. Evaluate gross changes--e.g., every 3 to 5 years, or after significant spring runoff events for a period of 10 years.

The significant management implications of this research project are primarily the long-term durability of these structures and their ability to positively affect the trout

population. The most inexpensive way to gather this information may be simply to wait five years (or until more normal flow patterns occur) before returning for analysis. The necessary follow-up measurements could be made by the Department of Fish, Wildlife and Parks fisheries biologist assigned to the area or as part of a master's thesis. These alternatives were not evaluated by the applicant.

FINANCIAL ASSESSMENT:

The RDGP budget breakdown is as follows:

Salaries and wages	\$ 64,985
Employee benefits	7,028
Contracted services	4,000
Supplies and materials	1,700
Communications	250
Travel	5,475
Miscellaneous	<u>8,000</u>
 TOTAL	\$ 91,438

The total cost of this work, \$135,432, seems excessive. It is not documented why five people (two principal investigators, a graduate research assistant, a technician, and hourly help) are needed to complete a limited number of trout surveys and stream measurements.

ENVIRONMENTAL EVALUATION:

Any major disruption would have occurred with the installation of the sills and bank revetments. No significant disturbances are anticipated due to the evaluation procedures. Positive impacts on the fishery, streambank stabilization, and, to a lesser degree, improved water quality would be expected results from the original project. The evaluation would verify the actual results.

PUBLIC BENEFITS ASSESSMENT:

The public would ultimately benefit from knowing if these rehabilitation treatments are effective. There are many more miles of stream in need of rehabilitation that could use the methods being evaluated here, but the evaluation could probably be accomplished by a less detailed and less expensive design.

RECOMMENDATIONS:

No funding is recommended for this project.

APPLICANT NAME: Montana Bureau of Mines and Geology
(MBMG)

PROJECT/ACTIVITY NAME: Hydrogeologic Characterization of
Landfill Sites in Montana

AMOUNT REQUESTED: \$ 226,767

OTHER FUNDING SOURCES AND AMOUNTS:

Applicant \$ 52,721

TOTAL PROJECT COST: \$ 279,488

PROJECT DESCRIPTION:

The objectives of this investigation are two-fold. First, a determination would be made for as many as eight landfill sites as to the potential for groundwater contamination. Second, the information obtained from each of the selected landfill sites would be used to predict the groundwater contamination impacts from similar landfills located in areas of like hydrogeologic setting. The intent is to aid state agencies and landfill owners/operators in determining (1) the location and number of monitoring wells required for a given landfill site, and (2) the site locations for future landfills.

An inventory of all existing landfill site locations and local geology would be compiled. This inventory would be used to establish a general classification of landfill sites based on typical hydrogeologic settings. From this master list, four to eight sites would then be considered for field investigations. The field investigation objective is to evaluate the potential for groundwater and surface water contamination attributable to the landfill. At each site four to six groundwater monitoring wells would be installed upgradient from the site to obtain background water data. The monitoring well installation phase would also include the collection of core samples during drilling and well development.

A groundwater and surface water sampling plan would be devised and implemented for each site. Groundwater elevation and groundwater quality data would be collected for each site throughout the duration of the project. In the event leaks were detected in the landfill, an attempt would be made to establish the extent and nature of the groundwater contamination. Groundwater recharge and discharge areas, as well as the interaction between groundwater and surface water, would also be identified.

TECHNICAL ASSESSMENT:

There is a recognized need for more and better information regarding landfill hydrogeology in Montana. The problem of landfill-generated water quality degradation is adequately described. There are definite economic and environmental advantages to understanding landfill hydrogeology at a site before acute contamination occurs.

There are, however, several misleading or inaccurate statements in the proposal. For example, since the passage of the Montana Environmental Policy Act (MEPA) nearly 20 years ago, the Department of Health and Environmental Sciences (DHES) has legally been required to evaluate the potential for groundwater contamination as part of the landfill licensing process. In addition, HB486, enacted in 1989, requires owners/operators of landfills serving a geographic area including 5,000 or more persons to monitor groundwater according to DHES specifications. The applicant did not address how its proposal may complement or overlap with monitoring under MEPA and HB486.

The significance of the information that would be developed from this study is unclear. Generalizations about landfill behavior based on hydrogeologic setting are probably not possible for many of the site-specific questions of importance to landfill management. Those broad features that may be possible to generalize probably have implications for landfill siting and operation that are already fairly well understood. While a short-term field investigation might obtain useful information about the particular sites investigated, it is doubtful that these data could be usefully extrapolated to other sites. The proposal is not convincing that the project would provide anything more about the benefits and liabilities associated with different hydrogeologic settings than is currently known. In fact, much of the information generated concerning individual landfills will soon be required of landfill operators regardless, under federal and state regulations.

Generally, it appears doubtful that the study as proposed would meet the objective of significantly aiding health agencies in managing the large pool of landfill sites in the state. It appears the coordination between the applicant and the principal state regulatory authority (DHES/Solid and Hazardous Waste Bureau) could have been better. There is no letter of support from DHES. No documentation of crucial state need is included.

FINANCIAL ASSESSMENT:

The RDGP budget breakdown is as follows:

Salaries and wages	\$ 62,920
Employee benefits	20,764
Contracted services	89,490
Supplies and materials	17,500
Communications	200
Travel	16,333
Rent and utilities	9,560
Equipment	8,000
Miscellaneous	<u>2,000</u>
 TOTAL	 \$ 226,767

The budget doesn't reflect a range of costs depending upon how many landfills would actually be studied. The grant application summary form indicates four to six sites would be studied, while the abstract says six to eight would be studied. The technical description says the final number of sites chosen would be determined by the number of different hydrogeologic settings representative of all or most of the landfill sites in Montana. How this would unfold is unclear.

The project coordinator would be a graduate research assistant. An hourly salary of \$15 seems high. It's not clear why an accountant is needed three hours/week. Contracted services for well drilling, sampling, materials, and travel are not prorated on the number of sites to be sampled. Salaries comprise about one-third of the total budget and appear high. Overall, the budget is not well documented.

ENVIRONMENTAL EVALUATION:

The short-term environmental consequences of aquifer testing at contaminated sites were not addressed by the applicant. There is a documented need for improved information concerning hydrology of landfills in order to protect against groundwater contamination. Water quality could be protected or improved as a result of gathering this type of information, but reviewers doubted that this project would be appropriate or adequate for addressing that need.

PUBLIC BENEFITS ASSESSMENT:

It is probable that the principal beneficiaries of this project would be the landfill operators whose sites were chosen for monitoring wells and water quality sampling. They would be saved the expense of monitoring when new regulations requiring

monitoring go into effect. The project's drilling and sampling may approximate that which will soon be required of operating landfills by state and/or federal law.

RECOMMENDATIONS:

No funding is recommended for this project.

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APPLICANT NAME: Deer Lodge Valley Conservation District

PROJECT/ACTIVITY NAME: A Feasibility Study of the Use of Timber Industry Wood Wastes for Reclamation of Mine-Impacted Areas

AMOUNT REQUESTED: \$ 59,535

OTHER FUNDING SOURCES AND AMOUNTS:

Applicant	\$ 5,600
Louisiana Pacific Corp.	\$ 400

TOTAL PROJECT COST: \$ 65,535

PROJECT DESCRIPTION:

The effects of mining and smelting emissions in southwestern Montana, particularly the Butte to Milltown Dam area, have been well documented. Over 100 years of mining have taken their toll on the soils and water of the upper Clark Fork drainage. Fish kills in the summers of 1988 and 1989 attest to the continued contamination of streambank and riparian soils.

Along with mining problems, the wood wastes from area sawmills are growing in size and creating potential fire, storage, aesthetic, and pollution problems. The sawmills within southwestern Montana, as well as throughout the state, are continuing to have problems disposing of the low-value wood waste.

Headwaters RC&D Area, Inc., would be contracted by the applicant to evaluate the technical feasibility of and market supply and demand for using composted wood wastes to satisfy the top-soiling requirement for mined land reclamation and find a solution to the wood waste disposal dilemma. The project would evaluate: (1) market feasibility, (2) technical feasibility of composting wood wastes, and (3) treatment effectiveness of using composted wood wastes in mined land reclamation.

TECHNICAL ASSESSMENT:

The project, or problem to be solved, is to utilize wood waste. It is tied to revegetation of an area disturbed by past mining by proposing that the product (wood waste compost) be evaluated on such a site.

The application does not detail past efforts to develop composting facilities or to use compost in the rehabilitation of disturbed sites. The authors allude to, but never specifically address, the past use of compost to help revegetate disturbed lands. Eko-Compost in Missoula has successfully shown that its compost can help revegetate disturbed sites. Worldwide, composting has been shown to be a valued method of reducing organic wastes to a useful product. Therefore, the proposed field study to demonstrate that compost is useful and valuable to re-establishment of vegetation would be a repetition of studies that have been carried out in Montana and worldwide. Compost will enhance the establishment of vegetation on disturbed sites.

The main problem of compost use is transportation cost to the point of application. The material is light, and tons per acre are required. The economic feasibility of compost use could be determined by a competent economist in a short period of time.

FINANCIAL ASSESSMENT:

The RDGP budget breakdown is as follows:

Salaries and wages	\$ 4,680
Employee benefits	1,560
Contracted services	39,900
Supplies and materials	2,890
Communications	4,805
Travel	2,700
Equipment	<u>3,000</u>
TOTAL	\$ 59,535

The project uses contracted services to complete the majority of all three phases. Only \$400 of the total \$65,535 budget is to be provided by one of the mills, which stands to benefit most from this project if it is successful. The costs of this project appear to far exceed the benefits.

ENVIRONMENTAL EVALUATION:

The study portion of this project would not have any impacts on the environment. The field portion is less clear. There is the potential for decomposed wood wastes, if placed in a floodplain, to enter the stream and exert an oxygen demand. This impact needs to be evaluated more thoroughly.

PUBLIC BENEFITS ASSESSMENT:

The timber industry would benefit most from this project. The public could indirectly benefit aesthetically and economically.

RECOMMENDATIONS:

No funding is recommended for this project.

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APPLICANT NAME: Yellowstone County Conservation District

PROJECT/ACTIVITY NAME: ZooMontana Construction Fund Drive

AMOUNT REQUESTED: \$ 300,000

OTHER FUNDING SOURCES AND AMOUNTS:

Applicant (fund-raising efforts)	\$3,000,000
ZooMontana Family of Boards	500,000
The Billings Gazette	175,127
The Brown Foundation	100,000
Burlington Northern Foundation	50,000
Montana Power Company	30,000
Plum Creek Timber Co.	25,000
Junior Women's League (ZooMobile)	25,000
Campaign teams and unsolicited gifts	269,723
DNRC, Renewable Resource Development Program grant (pending)	100,000

TOTAL PROJECT COST: \$4,574,850

PROJECT DESCRIPTION:

The ZooMontana Capital Campaign Committee is leading a \$4.5 million fund drive to build a natural habitat zoo and botanical garden along Canyon Creek just east of Billings. ZooMontana was established as a private nonprofit corporation in 1982. Since then, a downtown Billings office has been established, three full-time staff hired, and a land-use master plan completed. The 70-acre site has been deeded from the State of Montana, and site construction has begun. The first phase animal exhibits have been selected, and designs for the zoo's first major building, the Education/Administration Center, are being completed. Construction of a second bridge across Canyon Creek, pathways, and infrastructure began last spring. Major construction on buildings and exhibits will move forward as funding is secured.

The \$300,000 requested from RDGP would be used to construct the sewer/wastewater system, wells and water distribution system, and perimeter fence. (A \$100,000 Renewable Resource Development Program grant has been requested from DNRC for streambank reinforcement measures on Canyon Creek.) The water distribution system would serve the entire zoo campus and the freshwater needs of the animals, visitors, and botanical gardens. Septic tanks and water wells will be used until ZooMontana is able to connect with city water lines. For the safety of visitors and exhibit animals, a perimeter fence is essential in ZooMontana's first phase development.

Over \$1,800,000 has been raised toward this project. The organization has established a Capital Campaign Committee that has successfully raised over 40 percent of the \$4.5 million needed to construct a world-class zoo. Financial and public support for the zoo has been obtained in four ways: (1) capital campaign, (2) outreach education program, (3) "experience" exhibits, and (4) annual ZooGrass Festival benefit. Additionally, ZooMontana has received in-kind commitments of services, furniture, equipment, labor, and lumber that will save ZooMontana thousands of dollars once construction begins. It is foreseen that the state's investment in ZooMontana will stimulate increased private investment.

TECHNICAL ASSESSMENT:

DNRC commends ZooMontana's efforts to bring an outstanding educational opportunity to the people of Montana, but, according to criteria adopted in RDGP administrative rules, the ZooMontana Construction Fund Drive does not qualify as a "crucial state need." "Crucial state need" means a set of circumstances or conditions that require action to prevent or eliminate severe and unacceptable damage to public resources or to capture extraordinary benefits that would otherwise be lost. It appears that the project has a high likelihood of success with or without the requested construction funding. RDGP funds may accelerate project completion, but will not make or break the effort.

FINANCIAL ASSESSMENT:

The budget is well documented and reasonable. ZooMontana is a well-managed organization with demonstrated fiscal responsibility. This grant would help accelerate construction of the zoo's first phase. ZooMontana's funding request is shown below.

Sewer/wastewater system	\$ 150,000
Wells and water distribution	120,000
Perimeter fencing	<u>30,000</u>
TOTAL	\$ 300,000

ENVIRONMENTAL EVALUATION:

Activities associated with construction of the sewer/wastewater system and the water distribution system would likely have minor short-term impacts, primarily noise, dust, compaction of soils, and vegetative disturbance. Without knowledge of surface and subsurface conditions and detail of final design for the various structures planned, further impacts cannot be fully assessed. The applicant intends to hook up with city water/sewer service in the next three to five years. The fencing is not likely to have any adverse impact on the environment.

PUBLIC BENEFITS ASSESSMENT:

Initially, the zoo would provide 11 new jobs on the site and an estimated 72 new jobs indirectly. The "ripple" effect ZooMontana would create in the eastern Montana economy would be significant and immediate. Conservative visitor estimates indicate that 130,000 people would visit ZooMontana each year. Tourism is a major economic force. The proposed zoo would, without a doubt, increase the number of tourism dollars spent in the local community (Billings). Additionally, it would generate revenues for other towns and businesses, as people travel to this attraction. This project provides an ideal opportunity to creatively develop Montana's economy. The total economic impact of the zoo on the region is estimated to exceed \$6 million per year.

The Rocky Mountain region has over 50,000 children who would be served by ZooMontana. Many children in this region may otherwise never have the opportunity to see the exotic Siberian tiger or the majestic grizzly bear. These animals are accessible to most Montanans only through zoos. A great number of the students in this state have never been to a zoo, since the cost of travel and distance make it prohibitive. There is an increasing public desire in Montana for this type of quality educational and family recreational opportunity, as evidenced by the success of ZooMontana's ZooGrass Festival (over \$55,000 raised), the Montana Fair Exhibit (over 100,000 visitors), and ZooMontana's Education Outreach Program (over 45,000 served).

RECOMMENDATIONS:

No funding is recommended for this project.

APPLICANT NAME: Town of Hot Springs
PROJECT/ACTIVITY NAME: Reutilization of Hot Springs Mineral Water Resource

AMOUNT REQUESTED: \$ 300,000

OTHER FUNDING SOURCES AND AMOUNTS:

Applicant	\$ 47,000
Montana Department of Commerce	350,000
(pending)	
U.S. Department of Energy/	40,000
Bonneville Power Administration	
(BPA) (pending)	
Hot Pool Committee	45,000

TOTAL PROJECT COST: \$ 782,000

PROJECT DESCRIPTION:

Hot Springs is a small, incorporated town located in Sanders County on the Flathead Indian Reservation. The history of this community has evolved around the hot springs' mineral waters that have been used for their therapeutic properties since long before Montana was a territory. Over the past 90 years, the outward appearance of and accommodations at the springs have changed many times. The town has historically depended on the springs for a major part of its economic stability.

A large bathhouse was constructed at Camas Hot Springs in 1948. At the time energy costs were not a large consideration. Over the years, however, rising energy costs and lack of proper management led to increased losses, and the facility was closed in 1986. Since that time, the town of Hot Springs has lost many other small businesses whose lifeline was the tourist trade generated by the springs. The loss of these businesses, coupled with the loss of the bathhouse, have led to higher unemployment, lower standards of living, loss of school enrollments, and a very depressed tax base.

In April 1989, a group of local businesses formed a non-profit corporation, Cam Redevelopment Corporation, Inc., in hopes that their joint efforts could revitalize a once thriving community. They are looking to the mineral springs once again as a non-polluting industry to enhance the area economy. A rehabilitated hot springs is expected to play an important role in attracting tourists, as people from all over the United States, Canada, and Europe who have used the springs in the past continue to inquire about them. If properly developed, this area

could become a major destination resort with resulting beneficial impacts on Montana's tourist industry. The corporation sought and obtained sponsorship of this proposal by the Town of Hot Springs.

Cam Redevelopment Corporation, Inc., has secured a 25-year lease on the property and buildings with an option for an additional 25 years from the Confederated Salish and Kootenai Tribes. The tribes are very supportive of the project but unable to assist financially. The project has wide community support and has raised over \$10,000 locally.

The applicant would use the \$300,000 in RDGP funds for construction only. Total construction cost is estimated at \$766,950 and includes:

1. Olympic-size mineral water pool for therapy, recreation, education, and exercise classes
2. Several hot mineral therapy pools
3. Saunas and steam rooms
4. Showers and locker rooms
5. Cooling area with mineral water and juice bar
6. Energy-efficient, geothermally heated building

Construction is scheduled to be completed over a six-month period. The corporation will pursue private financing for lodging, restaurant facilities, and a golf course.

TECHNICAL ASSESSMENT:

It is entirely logical for the Town of Hot Springs to seek economic rejuvenation through rehabilitation of the old resort. Other hot springs sites in the state do (at least sometimes) make money and buoy local economies. The physical characteristics of Camas Hot Springs probably limit the types of alternative development possible. Reservoir temperatures are far too low for power production, for instance (as in all western Montana geothermal systems), and flow rates are too low to consider industrial applications such as the ethanol project that has been contemplated at nearby Camp Aqua for several years. It is commendable that local residents and business people are willing to contribute their own resources to the efforts.

The proposed project itself, however, seems almost too skeletal to be judged intelligently at this point. The applicants evidently have not hired an engineer yet to design the geothermal features of the complex. The only drawing included in the application is a very basic floor plan (which appears not to incorporate a number of elements described in the text of the application).

Another feature of the proposal that needs better definition is exactly how the proposed complex would be marketed to potential customers. Hot Springs is a remote location, and a well-planned marketing strategy would be needed to generate the business required to make the complex economically successful.

The Hot Springs area is certainly in need of an economic boost, and it may be that the planned complex could provide one. However, the information submitted does not provide enough detail to judge its feasibility.

Another point needing clarification is what legally binding relationship Cam Redevelopment Corporation, Inc., has with the public entity sponsoring the project. Since private organizations are ineligible for RDGP grant funds, the role of the Town of Hot Springs--i.e., its authority to control the project, make management decisions, and financially benefit from project proceeds--needs to be better explained.

FINANCIAL ASSESSMENT:

It is extremely difficult to evaluate the financial aspects of this proposal based on the information provided. The application lists \$767,000 for total construction costs, \$300,000 of which would come from RDGP. Most of the balance of the construction funding (\$467,000) would presumably come from the Department of Commerce's Community Development Block Grant funds and BPA's Super Good Cents Program. The applicant does not state in the application what these other funds would be used for, nor has RDGP been notified that these funds have been received. Without an in-depth assessment of overall project costs, the reasonableness of the applicant's request for \$300,000 cannot be sufficiently determined.

ENVIRONMENTAL EVALUATION:

Not enough information is included to determine the long-term effect of the proposed development on the hot springs' hydrology. The construction phase of the project would have short-term localized impacts, such as noise, dust, traffic, and soil compaction.

PUBLIC BENEFITS ASSESSMENT:

If the applicant achieves its goal of making the hot springs a major destination resort, the economic benefit to the area and Montana would be considerable. Sanders County residents suffer from chronically high unemployment and below average annual income, both of which would be improved, directly and indirectly, as the result of the project.

RECOMMENDATIONS:

No funding is recommended for this project as proposed. Funds may be more appropriately requested from the Department of Commerce's Business Assistance Programs.

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APPLICANT NAME: Sweet Grass County Conservation District

PROJECT/ACTIVITY NAME: An Accelerated Soil Survey Program for Montana

AMOUNT REQUESTED: \$ 298,080

OTHER FUNDING SOURCES AND AMOUNTS:

Applicant	\$ 20,664
USDA/Soil Conservation Service	\$ 215,118

TOTAL PROJECT COST: \$ 533,862

PROJECT DESCRIPTION:

The purpose of this grant request is to accelerate the present soil survey program in Montana. Soils information and mapping are lacking in portions of 20 counties. The Montana counties with areas still in need of soil survey information include: Beaverhead, Chouteau, Custer, Deer Lodge, Flathead, Gallatin, Garfield, Golden Valley, Granite, Hill, Jefferson, Lincoln, Meagher, Musselshell, Park, Phillips, Sanders, Silver Bow, Sweet Grass, and Wheatland. Agricultural operators, local governments, planners, developers, and state and federal agencies make use of soil survey information. Soils information is necessary for soil and water conservation planning, water quality planning, and preventing costly land management and development problems.

The primary objective of the conservation district's request is to assist the districts that are currently lacking soils information and mapping. If the grant money becomes available, the conservation district would meet with the Soil Conservation Service (SCS) and choose priority areas in 6 of the 20 counties that have areas lacking soil surveys. The grant money would be divided between the six cooperating districts and allow each district to hire one soil scientist for a period of two years. The soil scientist would receive training, field equipment, office space, travel expenses, and general administrative support from SCS. The conservation district would provide clerical services.

Accomplishment of this project would result in an additional 600,000 acres being mapped. At current staffing levels, soil surveys in Montana won't be completed until 1998, according to SCS. If SCS funding is reduced as anticipated, and state support is not given, completion could be delayed until sometime past the year 2000.

TECHNICAL ASSESSMENT:

Accurate soils mapping and accompanying interpretations are used by a host of land resource specialists and planners. There is a documented and well-supported need for this information.

Although accurate soil surveys are very useful, farm and ranch planning, waste site selection, construction impact mitigation, and mine reclamation planning are not precluded in areas lacking published soil surveys. Farmers and ranchers can obtain soils information from local SCS staff (soil scientists and conservationists) through individual requests. The siting of facilities such as waste disposal sites and mining operations often requires soils investigations with greater detail than SCS surveys and that are routinely performed by company staff or private consulting soil scientists. Severe and unacceptable damage caused by mining operations and major facility siting is not an inherent result of lack of SCS soils mapping.

FINANCIAL ASSESSMENT:

The proposal is that the state pay 93.5 percent of the salaries and benefits for six soil scientists over a two-year period. SCS would cover the remaining 6.5 percent. Salaries and benefits appear to be reasonable. Annual salary and benefits for the soil scientists are \$26,562 apiece.

The salaries and benefits portion of the budget is summarized below:

<u>Cost Category</u>	<u>RDGP Contribution</u>	<u>SCS Contribution</u>	<u>TOTAL</u>
Salaries and wages	\$ 242,340	\$ 16,800	\$ 259,140
Fringe benefits	55,740	3,864	59,604
TOTALS	\$ 298,080	\$ 20,664	\$ 318,744

The Conservation Districts Division of DNRC received a \$300,000 RIT grant in 1987 for the accelerated soil survey. To date \$65,000 remains to be disbursed. The 1987 contract requires that 300,000 acres be mapped; so far 247,043 acres have been mapped.

ENVIRONMENTAL EVALUATION:

No positive or negative effects on the environment would directly result from this project.

PUBLIC BENEFITS ASSESSMENT:

Thirty percent of the state of Montana (20 percent of private lands) lacks accurate soils information. This lack of soils information can result in poor land management decisions that can lead to future problems such as soil erosion, ground-water and surface water pollution, and poorly designed urban or commercial development. These problems may be costly to all Montanans due to the expenditure of public funds required to find solutions and reclaim the damaged natural resources. Soils information is used by private landowners, businesses, local governments, and state and federal agencies for a wide variety of purposes, including: (1) land purchase and development decisions, (2) water reservations process, (3) design of efficient cropping and irrigation systems, (4) design of efficient range and pasture management systems, (5) development of recreational opportunities, and (6) compliance with the Food Security Act (mandatory conservation farm plans and conservation reserve plans).

Funding for the 1987 RDGP grant to accelerate the soil survey was approved to assist with meeting the deadline for farm and ranch planning under the 1985 Food Security Act. An October 1989 SCS quarterly progress report stated that planning goals for the Food Security Act were met by September 30, 1989. All Montana farmers and ranchers requesting assistance received help developing a conservation plan and will remain eligible for U.S. Department of Agriculture programs. Since the deadline for farm planning under the Food Security Act has been met, an accelerated soil survey is no longer crucial. The soil survey will be completed with or without the assistance of RDGP funds.

RECOMMENDATIONS:

No funding is recommended for this project.

APPLICANT NAME: Stillwater Conservation District

PROJECT/ACTIVITY NAME: Field Evaluation of Plastic Lining and Fabrication Process

AMOUNT REQUESTED: \$ 89,400

OTHER FUNDING SOURCES AND AMOUNTS:

Applicant	\$ 24,295
Soil Conservation Service	Amount not specified
Montana State University	Amount not specified

TOTAL PROJECT COST: \$ 113,695

PROJECT DESCRIPTION:

The Stillwater Conservation District has long recognized the resource degradation caused by canal seepage within Stillwater County. Land adjacent to the Yellowstone River is often highly salinized, and irrigation water leaching through these soils returns to the Yellowstone River carrying dissolved salts. Canal seepage within sodic and saline soils has taken land out of production from the encroachment of saline areas into cropland.

Many canal systems within the state are in drastic need of improvement. Most have areas of excessive seepage and deteriorated concrete pipeline structures that are in need of replacement. This project would demonstrate an alternative that may reduce the costs of replacement of many components of Montana's irrigation canal infrastructure.

The Stillwater Conservation District is working cooperatively with the Cove Ditch Irrigation Company to become involved in the test lining process being developed by Innovative Process Corporation. Together they have identified a specific location on a canal system that has an extensive seepage problem resulting in salinized cropland that damaged and destroyed crops. This area is adjacent to the Yellowstone River.

Installation preparation would be coordinated by Innovative Process Corporation and the Soil Conservation Service (SCS). Design criteria for required canal preparation prior to installation would be specified by the Soil Conservation Service in cooperation with Cove Ditch Irrigation Company. The Stillwater Conservation District would schedule field demonstration tours during construction, if feasible, and conduct on-site tours after construction for several ditch companies in the Stillwater and Yellowstone County area. At this time an

Innovative Process Corporation technician would provide videos and technical information as to the other lining capabilities of the materials, such as lining and rehabilitation of deteriorating pipelines and culverts.

The Stillwater Conservation District would be responsible for documenting the economics of the lining project, including comparable cost data from existing lining materials. It would also document the amount of water saved by this project and prepare a report identifying the Soil Conservation Service's engineering recommendations for installation specifications. Throughout the irrigation season and when the liner is installed, observations as to the liner's performance and compatibility with livestock and wildlife would be documented and published in Montana agricultural news outlets such as *Montana Stockman*, *Mont-Wyo News*, and local conservation newsletters.

TECHNICAL ASSESSMENT:

The RDGP grant proposal does not present sufficient information to enable an assessment of technical feasibility. Considerably more detail is needed on whether previous laboratory or other work has been conducted, costs, project need and urgency, work schedule, qualifications and background of the private company, potential environmental impacts, and engineering design. The applicant has presented little information on other alternative technology, implying that this proposal represents the most cost-effective solution to a widely recognized problem. Without an in-depth assessment and evaluation of other technology, management options, etc., the current effort is difficult to assess.

FINANCIAL ASSESSMENT:

Costs of this project cannot be evaluated because of lack of detail. For example, \$70,000 for supplies and materials and \$12,000 for equipment are not substantiated by the information presented. Further, a considerable amount of time and expense is represented as being contributed by others (i.e., SCS and Montana State University), yet the description of the work to be performed by them is lacking detail.

ENVIRONMENTAL EVALUATION:

Any environmental impacts that might result from this project are difficult to determine without more information on the construction methods proposed. Impacts would need to be assessed more fully upon development of the project design and specifications.

PUBLIC BENEFITS ASSESSMENT:

If the project were to ultimately result in wide acceptance of low maintenance, cost-effective, new technology that would eliminate seepage losses over the long term, then public benefits would be considerable. In the present, benefits accrue to those interests evaluating new technology options.

RECOMMENDATIONS:

No funding is recommended for this project.

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APPLICANT NAME: Glacier County

PROJECT/ACTIVITY NAME: Glacier County Experimental Lateral Drilling Project

AMOUNT REQUESTED: \$ 232,240

OTHER FUNDING SOURCES AND AMOUNTS:

J & G Operating \$ 42,067

TOTAL PROJECT COST: \$ 274,307

PROJECT DESCRIPTION:

The applicant (Glacier County) proposes to fund a private drilling company's efforts to increase oil production from an existing stripper well. Envisioned benefits include jobs, increased mineral taxes, and improvement of the local economy.

The technology selected involves drilling horizontally from the primary wellbore into the pay zone to increase contact with the oil reservoir. The transition from the vertical to the horizontal phase would expose approximately 400 to 500 feet of new reservoir. The result of the project is expected to be an increase in the production of the current well.

TECHNICAL ASSESSMENT:

Oil and gas wells permitted under Title 82, Chapter 11, MCA, are ineligible for RDGP funding (90-2-1112, MCA). The applicant's statement that the "project is covered under an existing Drilling and Production Bond from the Board of Oil and Gas Conservation" precludes funding.

Irrespective of this constraint, reviewers felt that the proposed technology is commonplace in the Williston Basin and elsewhere and that RDGP funding of a project that would primarily benefit private interests (the operator and oil and gas lessor) is inappropriate. Solutions to stripper well economic problems are not likely to occur as a result of funding this project.

FINANCIAL ASSESSMENT:

The benefits of this project do not appear to exceed the cost. One individual well is unlikely to start an economic boom, as claimed in the application.

The RDGP cost breakdown is as follows:

Contracted services	\$ 227,040
Drill bit	4,200
Miscellaneous	<u>1,000</u>
TOTAL	\$ 232,240

Operator contributions amount to \$42,067 mostly in the form of equipment--e.g., wellbore and casing, tubing, pumps, rods, etc.

ENVIRONMENTAL EVALUATION:

Major adverse environmental impacts are not anticipated. Proper care in the construction of the drilling location and access road, disposal of drilling fluids and other wastes, and safety precautions would mitigate most impacts. Site-specific evaluation of the location and mitigation measures might need to be conducted by the Board of Oil and Gas Conservation.

PUBLIC BENEFITS ASSESSMENT:

Benefits, other than to the operator and mineral lessor, are probably minor. Application to other wells or fields is doubtful.

RECOMMENDATIONS:

No funding is recommended for this project.

CHAPTER V

STATUS REPORT OF ACTIVE PROJECTS APPROVED FOR FUNDING BY THE 1989 LEGISLATURE

This chapter summarizes the status of active projects that were funded by the 1989 Montana Legislature.

1. Lewis and Clark County Conservation District, Blackfoot River Abandoned Mines

This project is composed of three sites in the Lincoln area. Reclamation at these sites will include disposal of tailings from drainage ways; sealing all openings; disposing of all structures, debris, and trash; and liming, replacing topsoil, and revegetating all disturbed areas. This project is under contract, but work has not yet begun. The 1989 legislature appropriated \$300,000 for this project.

2. State Lands, Department of, Elkhorn Creek Water Quality Improvement Project

The proposed reclamation will remove the mill tailings pile from the Elkhorn Creek floodplain. The mine adit discharge will be piped around the tailings, and the site will be contoured and revegetated. This project is under contract, but construction has not yet begun. The 1989 legislature appropriated \$300,000 for this project.

3. State Lands, Department of, Wood Chute Creek Basin Water Quality Improvements

Reclamation of this site will include disposing of mine structures, closing mine openings, contouring the tailings, isolating the tailings from surface runoff, and revegetating the disturbed areas. This project has not yet been contracted. The 1989 legislature appropriated \$300,000 for this project.

4. Montana State University (MSU), Reclamation Research Unit,
Fate of Cyanide in Soils and Heap-Leach Pads

MSU will evaluate the fate and transport of cyanide and cyanide-metal complexes in three typical soils and in heap-leach pads. Work has commenced on this project. The 1989 legislature appropriated \$140,243 for this project.

5. Montana Bureau of Mines and Geology (MBMG), Land Application
of Cyanide Leach Solutions

The purpose of this laboratory investigation is to evaluate whether oxidizing residual cyanide is an adequate method of protecting the environment from potentially toxic metals. A research site has been established, and the lysimeters and neutron tubes have been installed. MBMG is currently preparing a test to determine the rate of movement through the system. The first cyanide application is expected in spring 1991. The 1989 legislature appropriated \$91,161 for this project.

6. Montana Salinity Control Association (MSCA), Salinity
Control: A Nonpoint Source Pollution Management Program

MSCA will continue to work on reclamation of saline seep areas in Montana. Fieldwork and planning will begin on at least 50 new sites. DNRC is currently in the process of finalizing a contract for this project. The 1989 legislature appropriated \$200,000 for this project.

7. Health and Environmental Sciences, Department of (DHES),
Solid and Hazardous Waste Bureau, Pesticide Contamination
Cleanup in Montana

DHES will investigate and clean up pesticide-contaminated sites in, or adjacent to, three rural airports and two weed control districts. Sampling of three sites to determine the extent of contamination is under way. Preliminary results of the treatability study indicate white rot fungi may successfully degrade pesticide contaminants in soil. This method was field-tested at the Joliet site, the site having the worst contamination problems. The 1989 legislature appropriated \$150,000 for the project.

8. Butte-Silver Bow, Government of, Public Lands Reclamation Project

This project involves reclaiming publicly owned land contaminated by mine-waste fill materials. There are eight project sites: public school yards, ball fields, and parks. Butte-Silver Bow has completed the engineering work and will do the construction work itself. Most (75 percent) of the construction is expected to be completed by fall 1990. The 1989 legislature appropriated \$120,800 for the project.

9. Toole County, North Toole County Reclamation Project

The objectives of this ongoing project are to continue inventory and assessment of sites needing reclamation, characterize groundwater quality in the area, accomplish removal and burial of abandoned buildings and equipment, continue soil reclamation research, and apply results to other sites. The contract for this project is currently being negotiated. The 1989 legislature appropriated \$299,040 for the project.

10. Montana State Library, Montana Natural Heritage Program

The Natural Heritage Program is a comprehensive, computer-assisted inventory of Montana's biological resources, emphasizing rare, threatened, or endangered plant and animal species and biological communities. Records continue to be added to the Heritage Program. There are currently more than 5,000 records in the databases. The program has been instrumental in land management decision making. The 1989 legislature appropriated \$197,607 for this project.

11. State Lands, Department of, Middle Fork Warm Springs Creek Reclamation Project

Reclamation proposed includes disposing of mine structures, closing mine openings, contouring tailings, isolating tailings from surface runoff, and revegetating disturbed areas. This project is not yet contracted. The 1989 legislature appropriated \$150,000 for this project.

12. Montana Bureau of Mines and Geology, Use of Natural Zeolites in Reducing Heavy Metal Concentrations at Mining Operations and Impacted Lands

The purpose of this project is to investigate the use of naturally occurring zeolites in tailings impoundments, disposal sites, and reclamation practices at heavy metal contaminated sites. This project is not yet contracted. The 1989 legislature appropriated \$149,238 for this project.

13. Kalispell, City of, Lawrence Park Slope Stabilization and Reclamation

The city proposes to stabilize a hillside that is continually sloughing and threatening a local golf course. This project is slated for construction September 15, 1991. The 1989 legislature appropriated \$170,260 for this project.

14. Montana Board of Oil and Gas Conservation (BOGC), Broadview Well

Saline water flowing from a deteriorated well is causing problems in the area west of Broadview, Montana. The project plans are to re-enter the well, recover any tools left behind, and cement off the leaking formations. BOGC anticipates project completion by December 1990. The 1989 legislature appropriated \$65,600 for this project.

15. Natural Resources and Conservation, Department of, Conservation Districts Division, Nonpoint Source Pollution Control in Montana

A series of 16 small projects will demonstrate methods for controlling sedimentation from agriculture, forestry, mining, and channel modification. The public education component will disseminate information on nonpoint pollution and methods for control. This project contract is currently being drafted. The 1989 legislature appropriated \$262,573 for this project.

CHAPTER VI

STATUS REPORT OF ACTIVE PROJECTS APPROVED FOR FUNDING BY THE 1987 LEGISLATURE

This chapter summarizes the status of active projects that were funded by the 1987 Montana Legislature.

1. State Lands, Department of, Upper Blackfoot River Streambank Reclamation

The purpose of this project is to reclaim streambanks, floodplains, and disturbed areas damaged by hard-rock mining in the Blackfoot River drainage. Lewis and Clark County Conservation District has received a RDGP grant from the 1989 legislature for additional cleanup of mine wastes along the upper Blackfoot River that will be coordinated with this project. This project is under contract, but construction has not yet begun. The 1987 legislature appropriated \$107,000 for this project.

2. Fish, Wildlife and Parks, Department of (DFWP), High Ore Creek Reclamation Project

The purpose of this project is to improve the water quality of High Ore Creek and the Boulder River. Both drainages are adversely impacted by metal contaminants originating at this site. Reclamation will include removing tailings from the creek, enlarging and lining diversion ditches, and constructing sediment ponds. Construction is under way, and DFWP anticipates completion by December 1990. The 1987 legislature appropriated \$198,600 for this project.

3. State Lands, Department of (DSL), Snowshoe Creek Streambank Reclamation

The purpose of this project is to reclaim streambanks, floodplains, and disturbed areas damaged by hard-rock mining activities in the Snowshoe Creek watershed near Libby, Montana. Construction of this project has been completed. The 1987 legislature appropriated \$107,000 for this project.

4. Toole, County of, North Toole County Reclamation Project

This is an oil-field reclamation planning and construction project that will help alleviate contamination of soil and groundwater, remove abandoned equipment and debris, and provide general surface reclamation and site restoration. The 1985 and 1987 North Toole County Reclamation Projects have been combined. To date 20 sites have been reclaimed. The bids for these sites came in lower than expected, so there are some remaining funds. These funds will be used for construction in June 1991. The 1987 legislature appropriated \$150,000 for this project.

5. State Lands, Department of (DSL), Nellie Grant Mine Reclamation

DSL will reclaim streambanks, floodplains, and the areas disturbed by past hard-rock mining at the Nellie Grant mine south of Helena. This project has been contracted, but construction has not yet started. The 1987 legislature appropriated \$84,900 for this project.

6. Health and Environmental Sciences, Department of, Abandoned Oil Refineries

This project originally involved investigation, remedial action, and cleanup at five abandoned oil refineries. Responsible parties were found for four of the five refineries. Funds were restricted to the Arro Refinery near Lewistown, because no responsible party was found for this site. Sampling was conducted in the following Arro sites: tetraethyl lead area (including a building and adjacent soils), sludge pits, tar seeps, contaminated groundwater sites, and buried pipes. The contaminated soils were the most serious threat at the site. Cleanup of the lead-contaminated soils was completed in August 1990. This phase of the Arro Refinery cleanup project is completed. The 1987 legislature appropriated \$300,000 for this project.

7. Fish, Wildlife and Parks, Department of, Cataract Creek Reclamation Project

This hard-rock mine reclamation project entails reconstruction of an existing settling pond. DNRC has been advised of a pending enforcement action by the Department of State Lands. This project is therefore on hold until the matter is resolved. The 1987 legislature appropriated \$21,565 for this project.

8. Montana Salinity Control Association (MSCA), Montana Salinity Control Program

MSCA operates a program of technical field assistance designed to correct saline seep and reclaim land on a farm-by-farm basis. Recharge area identification, hydrogeologic investigation, and intensive cropping methods are used to develop reclamation plans. MSCA intended to develop approximately 50 plans during this contract period; from April 1988 to June 1990, 52 plans were developed. The 1987 legislature appropriated \$300,000 for this project.

9. Butte-Silver Bow, Government of, Anselmo Mine Yard Reclamation Project

This project involves cleanup and renovation of the mine yard, buildings, and structures. This will allow the yard to become the central attraction for the Butte/Anaconda Historical Parks System. During the summer of 1990, the Department of State Lands (DSL) removed all asbestos from the site. The city is waiting for DSL to cap an open mine shaft before letting contractors on the site because of safety concerns. Butte is in the process of developing architectural and engineering plans. The 1987 legislature appropriated \$150,000 for this project.

10. Lower Musselshell Conservation District, Groundwater from Abandoned Mine Workings for Irrigation and Instream Flows, Lower Musselshell River

This project involves two separate studies. The first determined the quality, quantity, and usability of water stored in abandoned underground coal mines, examined the potential of water storage to supplement Musselshell River flows, and evaluated the cost-effectiveness of development of this water. Test pumping showed that it is not economically feasible or technically viable to pump water from the mines for irrigation purposes. A report and the conservation district's recommendations are expected by fall 1991. Follow-up will be carried out to determine water quality characteristics and subsidence for future reference.

The second phase consists of studies in the Musselshell River basin on water availability, water conveyance efficiency, amounts of water coming from off-stream storage, and amounts of instream water. Recommendations for Musselshell River basin water management were gathered from local water users. As a result of these recommendations, all contract water users will be required to have measuring devices at diversions and schedule ahead to order contracted water. The 1987 legislature appropriated \$272,320 for this project.

11. Governor's Office and Oil and Gas Conservation, Board of (BOGC), Programmatic Environmental Impact Statement

This project is designed to meet the requirements of SB 184. This bill provided an exemption from provisions of the Montana Environmental Policy Act (MEPA) for oil and gas drilling permits issued by BOGC until the adoption of a programmatic environmental impact statement (EIS). This project involves the preparation of a final programmatic EIS and a corresponding detailed work and public involvement plan. The programmatic EIS was completed and adopted by the Montana Board of Oil and Gas Conservation in December 1989. The remaining work will involve MEPA implementation, such as publishing a handbook titled *User's Guide to Drilling Oil Wells in Montana* and possibly purchasing more reference material. The 1987 legislature appropriated \$183,800 for this project.

12. Natural Resources and Conservation, Department of, Sodium and Salinity Sources in the Powder River Basin--A Chemical-Budget, Modeling Approach

The objectives of this project are to: (1) expand the Powder River water quality database by compiling existing data and collecting new data, (2) analyze variability and trends in water quality, (3) develop a water quality model capable of simulating monthly streamflow and dissolved solids loading, and (4) evaluate the effects of various management scenarios on surface water quality of the Powder River. Expansion of the water quality database has been accomplished, statistical analysis of the water quality data is 95 percent finished, water quality model development is 90 percent done, and Powder River management scenarios are 75 percent finished. All project objectives and the first draft of the project report are nearing completion. The 1987 legislature appropriated \$89,257 for this project.

13. State Lands, Department of, Drill Hole Reclamation in Montana; Hole-Plugging Trials Utilizing Bentonite

The purpose of this project is to field-test different bentonitic drill hole abandonment materials and a variety of abandonment technologies applicable to Montana exploration activities. Objectives include laboratory testing to determine optimum bentonite characteristics; field-testing waste bentonite in shot holes; developing methods of bentonite placement; monitoring effects of shot hole drilling, plugging, and blasting; evaluating economic benefits of using these materials; and

determining their efficiency in preventing mixing of waters from different aquifers. This project has been combined with the Montana Bureau of Mines and Geology's bentonite project (number 19).

Drilling at the clinker site was completed in April 1990, and all holes were plugged at this site. PVC casing was installed in 25 of these holes during the plugging procedures. Infiltration monitoring has begun for these sites. Plugging at both the sandstone and shale sites has begun, and completion is expected prior to the 1990 winter freeze-up. Infiltration tests will start after plugging. Preparation for deep hole and seismic trials has begun. Upcoming work will include refining program details, preparing bid specifications, and ordering materials for the 1991 field season. The 1987 legislature appropriated \$100,000 for this project.

14. Natural Resources and Conservation, Department of, Conservation Districts Division, Montana's Accelerated Soil Survey Program

RDGP funding is being provided for additional soil scientists and equipment to hasten completion of the soil survey in Montana. The contract requires that 300,000 acres be mapped; the July 1990 progress report showed that 319,261 acres have been mapped. This project is near completion. The 1987 legislature appropriated \$300,000 for this project.

15. Governor's Office, Headwaters RC&D Area, and Deer Lodge Valley Conservation District, Clark Fork Reclamation Demonstration for Floodplain Systems Impacted by Mining

This project will demonstrate several reclamation techniques on land near the upper Clark Fork that has been contaminated with copper, cadmium, and arsenic wastes from mining and smelting. Field construction was completed in August 1990. Seeding and planting will be completed in fall 1990 or spring 1991. A tour of the project is planned for summer 1991. Monitoring will continue through fall 1991. The 1987 legislature appropriated \$130,000 for this project.

16. Montana Bureau of Mines and Geology (MBMG), Groundwater Information Center--Deep Aquifer Databases

MBMG will develop an electronic database of the geology and water quality of deep aquifers. Data entered so far include 212 water quality analyses of deep aquifers in the eastern two-thirds of Montana; 428 water quality analyses of the Judith River, Eagle, and Kootenai formations; and 54 analyses of

aquifers in south-central Montana. This task is virtually completed. Software has been developed to handle entry of data on depth below land surface of important aquifers in eastern Montana. Data entry is under way on this task, and 15 of the 2,100 records have been entered. Other work remaining is the production of aquifer maps developed from the databases. The 1987 legislature appropriated \$155,950 for this project.

17. University of Montana, Botany Department, Improving the Biotic Resources of the Upper Clark Fork River

The university is conducting a study to explain the reduction in trout populations in the upper Clark Fork. A report on the macroinvertebrate habitat assessment portion of the study was received in August 1990. The remaining aquatic macro-invertebrate studies are completed; results are being analyzed and put into report form. Artificial stream studies will continue, along with the evaluation of phosphorus, nitrogen, and calcium in limiting standing algae crops and algae growth. The 1987 legislature appropriated \$26,638 for this project.

18. Butte-Silver Bow, Government of, Urban Enhancement/Mitigation of Past Mining and Smelting Damage Through Urban Forestry

This project established an urban tree-planting program in Butte. In the summer of 1989, 64 trees were planted, and 100 trees were planted in the summer of 1990. A current waiting list numbers 20 people, and another 100 trees will be planted in 1991. Butte is currently working on a three-year contract with a nursery to supply trees. It will continue to work toward making the tree-planting project self-sustaining. The 1987 legislature appropriated \$100,000 for this project.

19. Montana Bureau of Mines and Geology (MBMG), Low Grade Bentonite for Shot Hole Plugging

MBMG will document the usability of low grade (waste) Montana bentonite for seismic shot hole plugging, possibly resulting in more economical procedures to protect groundwater. Objectives include laboratory testing to determine optimum bentonite characteristics; field-testing waste bentonite in shot holes; developing methods of bentonite placement; monitoring effects of shot hole drilling, plugging, and blasting; evaluating economic benefits of using these materials; and determining their efficiency in preventing mixing of waters from different aquifers. This project has been combined with the Department of State Lands' bentonite project (number 13).

Drilling at the clinker site was completed in April 1990, and all holes were plugged at this site. PVC casing was installed in 25 of these holes during the plugging procedures. Infiltration monitoring has begun for these sites. Plugging at both the sandstone and shale sites has begun, and completion is expected prior to the 1990 winter freeze-up. Infiltration tests will start after plugging. Preparation for deep hole and seismic trials has begun. Upcoming work will include refining program details, preparing bid specifications, and ordering materials for the 1991 field season. The 1987 legislature appropriated \$45,890 for this project.

CHAPTER VII

STATUS REPORT OF ACTIVE PROJECTS APPROVED FOR FUNDING BY THE 1985 LEGISLATURE

This chapter summarizes the status of active projects that were funded by the 1985 Montana Legislature.

1. Montana Bureau of Mines and Geology (MBMG), Groundwater Information Center

The purpose of this project is to develop a computerized data management program to organize and disseminate Montana's groundwater data. All but one of the project objectives have been completed. MBMG must still set up outside user access capability so the database will be available for direct use by private and public users. This is expected to be accomplished before January 1991. The 1985 legislature appropriated \$75,000 for this project.

2. Anaconda-Deer Lodge County, Deer Lodge Valley Conservation District, and Headwaters Resource Conservation and Development Area, Anaconda Soil Stabilization and Erosion Control

This project entails planting trees, shrubs, and grasses on the steep hills south of Anaconda that have eroded as a result of years of timber harvesting and smelting operations. More than 100,000 trees and shrubs have been planted, with an average overall survival rate of 62 percent over the past three years. A settling basin to control runoff into Anaconda from these hills was built in June 1988. All funds for this project have been spent, but DNRC is withholding 10 percent until the final report is received, as required by the contract agreement. The county is currently in the process of drafting the final report. The 1985 legislature appropriated \$150,000 for this project.

3. Montana State University, Water Resources Research Center, Stream Restoration of Confederate Gulch and Deep Creek

This is a study project to develop, evaluate, and demonstrate restoration of trout habitat in streams that have been structurally damaged by placer mining and activities having similar effects. Several treatment measures were installed,

including riprap, cable tree revetment, and log sill structures. The first four phases--preplanning investigation, preproject design, final project design, and project construction--are completed. The evaluation phase is not completed; remaining work includes fish population inventory, spawning survey, data collection and analysis, and final report preparation. The 1985 legislature appropriated \$134,249 for Confederate Gulch and Deep Creek.

4. Toole, County of, North Toole County Reclamation Project

This is an oil-field reclamation planning and construction project that will help alleviate contamination of soil and groundwater, remove abandoned equipment and debris, and provide general surface reclamation and site restoration. The 1985 and 1987 North Toole County Reclamation Projects have been combined. To date 20 sites have been reclaimed. The bids for these sites came in lower than expected, so there are some remaining funds. These funds will be used for construction in June 1991. The 1985 legislature appropriated \$298,130 for this project.

5. Natural Resources and Conservation, Department of, Conservation Districts Division, Reclamation of Streambanks and Adjacent Areas Damaged by Placer Mining

The purpose of this project is to provide funding to conservation districts to undertake reclamation projects on streambanks and adjacent sites damaged primarily by placer mining activities. Negotiations are continuing with landowners in Madison and Meagher Counties. Project start-up on three projects is expected in spring of 1991. The 1985 legislature appropriated \$30,000 for this project.

6. Red Lodge, City of, Coal Miner's Memorial Park Revegetation and Irrigation Project

The purpose of this project is to provide soil stabilization and landscaping for Coal Miner's Park, a recently reclaimed coal dump and landfill. Completion of the contract for revegetation and irrigation has been delayed because ownership of the easterly portion of Coal Miner's Park could not be obtained until April 1990. The contractor is scheduled to complete the project in fall of 1990, but, due to tree order delays, planting cannot be completed until spring of 1991. The 1985 legislature appropriated \$100,000 for this project.

7. Powder River Conservation District, Irrigation Water Quality Study

The purpose of this project was to determine the potential long-term effects of irrigation on soils adjacent to the Powder River. This project has been completed, and the final report has been submitted and approved. All tasks were completed satisfactorily, and the contractor also did extra work not required in the contract. A grant closeout agreement has been sent to the conservation district. The 1985 legislature appropriated \$80,000 for this project.

8. Anaconda-Deer Lodge County, Sewage Facilities

The grant money will be used to fund a portion of the work needed on the discharge structure of the municipal sewage treatment facility. The 1985 legislature appropriated \$70,000 for this project.



